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The Predictive Relationship between Temperament, School Adjustment, and Academic
Achievement: A 2-year Longitudinal Study of Children At-risk

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of
Doctor of Philosophy at Virginia Commonwealth University

by

Maha Al-Hendawi

Master of Arts degree in Counseling, University of San Francisco, 2001
Bachelor of Arts degree in Education, University of Qatar, 1992

Director: Evelyn Reed, Ph.D.
Associate Professor, Department of Special Education and Disability Policy

Virginia Commonwealth University
Richmond, Virginia
September 2010

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I have always considered myself an outlier who can be interesting and provide curiosity for some people, but can seem to be noise for others who are primarily interested in the normal distribution simply because they do not care about outliers. As Gladwell (2009) says in describing the successful stories of outliers, an outlier rises in a good environment that helps her to flourish and succeed. All my accomplishments have occurred in a nurturing, caring environment that has provided for goodness of fit. This dissertation is another accomplishment of which I am proud. I am grateful for the people who have believed in me and supported me during this process, particularly my committee members who all have two things in common: intelligence and compassion. I selected them for these characteristics and have been honored that they accepted. I would like to thank my dissertation committee members as follows: Dr. Evelyn Reed, the chair of this dissertation and the chair of the Special Education Department, for introducing the area of temperament to me, for being as eager about this dissertation as I have been, for her continuing support and thoughtful review of this dissertation, and for her strong desire to celebrate this accomplishment soon. Dr. Kia Bentley, committee member, professor and director of the PhD program in social work, for mentoring me, being almost always available during those three past years, spending time discussing what it means to be a scholar in the field, listening carefully to what I said and what I did not say in a non-judgmental way which has fostered critical thinking, being a role model of a gifted teacher and current researcher, and being my inspiration. Kia is part of any success I have accomplished during these years. Dr. Maureen

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Abstract

THE PREDICTIVE RELATIONSHIP BETWEEN TEMPERAMENT, SCHOOL ADJUSTMENT, AND ACADEMIC ACHIEVEMENT: A 2-YEAR LONGITUDINAL STUDY OF CHILDREN AT-RISK

By Maha Al-Hendawi, Ph.D.

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy at Virginia Commonwealth University

Virginia Commonwealth University, 2010

Major Director: Dr. Evelyn Reed
Associate Professor, Department of Special Education and Disability Policy

Abstract

Individual differences in temperament can be a risk or a protective factor for a child, especially for children at-risk who possess single or multiple risk factors that may interfere with their educational success and affect their healthy development and their life-long outcomes. This research study examined the concurrent and longitudinal relationships between temperament, school adjustment, and academic achievement in children at-risk. Seventy-seven children, ages five to 11 years, were reassessed two years after an initial study. Their teachers completed the Temperament Assessment Battery for Children (TABC), the Behavior Assessment System for Children (BASC), and reported on the children's academic achievement. The results for the concurrent relationships showed significant relationships between the children's temperament and their school adjustment; negative emotionality significantly correlated with and predicted

school adjustment. Children's temperament was also found to have a significant relationship with academic achievement; persistence and activity level had significant correlations with academic achievement. Persistence, however, was the only predictor of academic achievement. In contrast, the longitudinal relationship between the children's temperament and their educational outcomes in terms of both school adjustment and academic achievement showed no significance. The concurrent relationships were found to be consistent with previous research; whereas the longitudinal relationships were found to vary from previous research. Implications for practice and considerations for future research directions are discussed.

CHAPTER I

Statement of the Problem

Children at-risk for school failure and behavior problems possess single or multiple risk factors that may interfere with their educational success and affect their overall performance and well being. These risk factors can be biological and/or environmental factors that create adverse conditions for their healthy development (Edwards, Mumford, & Serra-Roldan, 2007; Werner, 2000). Risk factors can be found within (a) an individual (e.g., low intelligence, a disability), (b) the family (e.g., poverty, divorce, parenting styles), (c) the school (e.g., teachers' quality, lack of resources), and/or (d) the community (e.g., a high crime neighborhood). Risks to healthy development can also include prenatal causes, such as poor nutrition and parental substance abuse (Masten, 1994).

Data have shown that across all populations, minority children constitute the majority of children-at risk. Minority children are those from culturally and linguistically diverse backgrounds; the two largest minorities in the United States are African Americans and people of Hispanic origin (Gradín, 2008). Data indicate that 54% of minority school-age children have single or multiple risk factors (Kominski, Jamieson, & Martinez, 2001). An average of various data estimates place about 20.8% of all American children in poverty in contrast to 42% of minority children (Lerner, Lowenthal, & Egan, 2003). Considering the fact that racial and ethnic diversity in the U.S. has grown dramatically in the last three decades, those percentages are likely to increase. Specifically, the percentage of Hispanic children has increased from 9% of

the child population in 1980 to 22% in 2008. Data indicate that by 2021, one in four children in the U.S. will be of Hispanic origin (U.S. Census Bureau, 2008).

Students with individual and/or environmental risk factors are more likely to have low academic achievement and fail in school (Nelson, Leone, & Rutherford, 2004). The consequences of student failure can have detrimental effects on the individual and on society as a whole. When a student fails to meet the academic requirements in school, negative outcomes during school and post-school years can result. During the school years, academic difficulties can result in grade retention and low scores on standardized tests (Brier, 1995; Hinshaw, 1992). A low level of academic achievement is often associated with behavior, social, and emotional problems (Kauffman, 2005). A student with a low level of academic achievement is more likely to engage in high-risk activities such as drug and alcohol abuse, and delinquency than are other children (U.S. Department of Health and Human Services, 2003). Students who experience these academic and/or behavior difficulties are more likely to drop out of school. Data indicate that about 50% of students who have academic and behavior problems drop out of school (U.S. Department of Education, 2007); additionally, 72.9% of high school students with behavioral problems have been suspended or expelled (Wagner et al., 2003).

Negative outcomes of student failure in schools continue into adulthood. Students who drop out of school are more likely to be unemployed (Caspi, Wright, Moffit, & Silva, 1998) and, if employed, they earn substantially less than high school graduates, resulting in a lower socioeconomic status (Kominski et al., 2001). Students with low academic achievement are more likely to need support from publically funded welfare, health care, and other social services (Rumberger, 1987).

However, research has shown that these negative educational outcomes for children at-risk can be minimized and controlled if children are exposed to interventions at early ages. In particular, increasing children's adjustment to school features, demands, and values can ameliorate the educational outcomes for children at-risk and set the stage for success (Lerner et al., 2003; Missall, 2002). Young children transition from relatively unstructured homes to a comparatively structured educational setting at an early age. Certain factors are significant in influencing whether the child adjusts or maladjusts to the demands, features, and values of the classroom. Children's individual differences, culture and values differences between home and school, as well as teachers' effectiveness in promoting goodness of fit between children's needs and classroom environments are factors that can influence the children's adjustment or maladjustment. When the child's individual differences are in conflict with the academic and social demands and values of the educational settings (e.g., not functioning on-task, failure to cooperate with peers, difficulty complying with rules), the child is likely to develop maladjusted behaviors. A child who has school adjustment problems may become anxious, withdraw, or exhibit disruptive, aggressive, or non-compliant behaviors (Keogh, 2003; Martin & Bridger, 1999). A child who is anxious in the classroom is likely to have difficulties in talking in front of the class and with participating in group activities. On the other hand, a child who exhibits non-compliant behavior is likely to have problems with completing tasks and sitting still when the teacher asks him/her to do so. As a result, for children who have adjustment problems school can be an unpleasant experience, and the child can become frustrated and disengaged from school and learning. In turn, teachers were found to underestimate the intelligence of children who are anxious or withdrawn (Martin, 1994). Also, teachers tend to provide less attention and

less instruction to children who exhibit disruptive behaviors than to those who have adjusted to the classroom's demands (Martin, 1994; Nelson, 1987; Pullis & Cadwell, 1982).

Early interventions that teach school adjustment skills are associated with a high level of academic achievement, school completion and post-school success (Blair, 2002). Data, however, indicate that children at-risk are more likely to begin school unequipped with the needed academic and social skills to adjust to the school environment and its demands, features, and values in order to succeed (Nelson et al., 2004). For example, about 46% of a nationally representative sample of kindergarten teachers indicated that over half the children in their class lacked the needed skills to adjust to the demands of the kindergarten classroom and, therefore, were unable to function productively (Rimm-Kaufman, Pianta, & Cox, 2000). Teachers are often more concerned about children arriving at school without effective self-regulation skills and their lack of ability to adjust well to the school environment than about their cognitive abilities (Blair, 2002).

The challenges encountered by children who have significant risks, despite years of educational interventions, continue to jeopardize children's access to the quality educational experiences that should result in positive educational outcomes for these children. Current educational services still respond inadequately to these children's needs; nor do they address the disparities between these disadvantaged children and their more advantaged and typically developing counterparts (Sanders & Jordan, 2000). Early interventions are needed that focus on minimizing the effects of risk factors on these children and promoting their early and long term success.

Rationale for the Study

In the initial study, Reed-Victor (2004) examined the concurrent relationship between temperament and school adjustment. The findings indicated that children's temperament was a significant predictor for their school adjustment, accounting for 58% of the variance. This current investigation is a follow-up study, which examined the concurrent and longitudinal relationships between children's temperament, school adjustment, and academic achievement. This follow-up investigation differed from the initial study in that it added two additional components to strengthen the research design: (a) school adjustment was measured by the Behavior Assessment System for Children- Teacher Rating Scales (BASC-TRS, Reynolds & Kamphaus, 1992), which is a widely used assessment measure in education and which has strong psychometric properties, and (b) academic achievement was added as another dependent variable in this follow-up study in addition to school adjustment. These additions broadened the investigation to include both academic and social behavior outcomes to provide a comprehensive picture of the educational outcomes.

This current investigation also differs from existing research in two ways. First, although the relationship between temperament, school adjustment, and academic achievement has been addressed in the literature, the focus in other studies has primarily been on typically developing children (e.g., Blair et al., 2004; Coplan et al., 2003; Nelson et al., 1999). This study, however, examined individual differences in temperament of children at-risk, including three risk groups (Title 1 programs, special education, and/or homeless education). The significance of examining temperament in children at-risk lies in the fact that such children encounter adverse conditions that negatively affect their healthy development and their educational outcomes. Thus, temperament can be a risk factor that can add additional stressors or can be a protective factor

that can minimize the negative effects of other risks that a child may have. Second, unlike previous research (e.g., Bramlett et al., 2000; Deater-Deckard et al., 2009; Newman et al., 1998), minority children were emphasized in this study, in that the majority of the participant children were African Americans (74%). Data have shown that African American children encounter single or multiple risk factors, as well as having a higher level of poverty, than white children or any other ethnic group. These factors can influence their educational outcomes (Lerner, Lowenthal, & Egan, 2003; Kominski, Jamieson, & Martinez, 2001). Therefore, identifying temperament profiles at an early age and understanding their relationship to educational outcomes can help in developing early intervention programs for children at-risk. Early intervention programs can focus on understanding the child's temperament, rather than on assigning blame for a child's problems, and can also aid in anticipating the conflicts that certain temperaments can bring into the classroom when the children who have them meet with certain demands and features of the classroom. This increased understanding of the role of temperament should help teachers to create a *good fit* that can allow the child's temperament to work with the demands and features of the classroom rather than setting the classroom in opposition to the child's temperament (Kristal, 2005). Identifying a child's temperament can reveal his/her individualized needs for learning specific self-regulation skills. Self-regulation skills interventions, which include helping children have a high level of attention, an ability to regulate emotions, and an ability to approach and attempt to solve problems in contrast to withdrawing, can be implemented to help children become aware of their behavioral patterns and can teach them to self-direct their behaviors. That is, these methods can enable children to learn ways to monitor and modulate their behaviors by enabling them to become sensitive to signs of

overstimulation and recognize their own need to pull back (Kerns, Esso, & Thompson, 1999; McClelland et al., 2007; Semrud-Clikeman, Nielsen, & Clinton, 1999).

Purpose of the Study

The purpose of this study was to contribute to the existing literature that targets children at-risk with the goal of increasing the quality of educational services that are delivered to them in order to increase their positive educational outcomes. Temperament in children at-risk is a risk or protective factor that can intensify or ameliorate negative effects for such children. This present study aimed to identify individual differences in temperament and assess their relationship to positive school outcomes for children at-risk. Specifically, this study proposed to investigate the children's temperament traits that are associated with and predict school adjustment and academic achievement concurrently and longitudinally.

Statement of the Research Questions

Three research questions were investigated in this study. The first two questions related to the current follow-up study (Time 2). The third question was concerned with the influence over time of the predictors from the initial study (Time 1) on the outcomes of the follow-up study.

Current Study (Time 2)

Question 1. What is the relationship between the four dimensions of temperament (inhibition, persistence, negative emotionality, and activity level), school adjustment (composite adaptive skills), and academic achievement among children at-risk?

Question 2. To what extent do the four dimensions of temperament (inhibition, persistence, negative emotionality, and activity level) explain variations in concurrent school adjustment and academic achievement among children at-risk?

Over-Time (Time 1 & 2)

Question 3. To what extent do the four dimensions of temperament in Time 1 explain the variations in school adjustment and academic achievement among children at-risk after a two year interval?

Overview of the Literature Review

A review of the literature on temperament has shown that research on temperament in educational settings is growing, with the majority of research studies examining the temperament characteristics of children who are developing typically. In this current study, a literature review on research into temperament and its relationship with school adjustment and academic achievement was conducted. The findings indicated that a significant relationship exists between temperament, school adjustment, and academic achievement.

First, school adjustment has been shown to be a significant factor that influences children's academic and social behaviors. Children who are well adjusted to school are equipped to meet the expectations and demands of the school environment; thus, these children are likely to be engaged in learning and become successful later in life. However, children who experience poverty, mental or physical disability, neglect, maltreatment, war, or natural disasters are more likely to find adapting to the school's environment to be challenging (Masten, 1994). Such children have been found to be at-risk for school failure and behavior problems. Research has indicated that children at-risk are likely to enter school lacking the needed abilities and skills to meet the school's demands and expectations for their academic and social behaviors (Blair, 2002). Individual differences, context factors, and their interactions can influence this school adjustment. Research has found that certain temperament characteristics of children (such as low levels of negative emotionality, high levels of self-regulation of emotions and behaviors, and low

activity levels), tend to be associated with a high level of adjustment (Liew, Eisenberg, & Reiser, 2004; Nelson, Martin, Hodge, & Kamphaus, 1999; Prior et al., 2001; Sanson et al., 2009).

Second, the literature review has also identified a significant relationship between temperament and academic achievement. Certain temperament characteristics, such as high levels of task persistence, low levels of activity, and low levels of inhibition, are significantly related to academic achievement and predictive of later academic achievement (Bramlett, Scott, & Rowell, 2000; Martin, Drew, Gaddis, & Moseley, 1988).

Overview of the Methodology

This study employed a non-experimental correlational design to examine the concurrent and longitudinal relationships between children's temperament, school adjustment, and academic achievement among children at-risk. A description of the participants, data collection, and data analyses are described below.

Participants

The sample in this study was comprised of 77 children at-risk who were assessed two years after the initial study by their current classroom teachers. Their risk status, based on their eligibility for school programs for children with disabilities, economic disadvantage, and/or homelessness, was determined during the initial study. Their chronological ages at the second assessment ranged from five through eleven years.

Data Collection

This study used longitudinal data that were collected in the initial and the two year follow-up phases. Demographic data were collected as well as teacher ratings of children's temperament, school adjustment, and academic achievement. Two standardized measures were used: the teacher form of the Temperament Assessment Battery for Children-Revised (TABCR;

Martin & Bridger, 1999) and the Adaptive Scales of the Behavior Assessment System for Children-Teacher Rating Scales (BASC-TRS; Reynolds & Kamphaus, 1992). Academic achievement was measured by the teachers' report of student achievement in four subjects: reading, math, science, and social studies.

Data Analysis

First, exploratory data analysis (EDA) was performed to clean and screen the data of any violations of the assumptions needed for the statistical analyses which could have influenced the results of this study. Second, descriptive data were obtained, including means and standard deviations for the demographics and for the examined independent and dependent variables. The data included the four scales for the temperament measurements, one scale for the composite adaptive skills scale of the BASC (Reynolds & Kamphaus, 1992), and the teacher report of academic achievement. Means and standard deviations for the variables by gender and eligibility for special education were also reported. In addition, correlations within the temperament dimensions were obtained as well as bivariate correlations on all the variables, in order to understand how each variable related to the others. Third, correlations and multiple regressions were conducted to address the three research questions about the concurrent and longitudinal relationships between temperament, school adjustment, and academic achievement.

Definition of Terms

Within the context of this study, the following operational definitions were used.

Temperament

In this study, temperament is defined as the biological individual differences in the behavior tendencies of the individual that indicate the person's pattern of responding to individuals and situations in the environment. It is the behavioral style or tendencies that affect

how a child responds to a situation. It is not a matter of *why* or *what* as *why* refers to the motivation of an action, and *what* refers to the ability of performing a task (Thomas & Chess, 1977). Four dimensions of temperament were measured: inhibition, activity level, negative emotionality, and task persistence using the teacher ratings form of the Temperament Assessment Battery for Children-Revised (TABCR; Martin & Bridger, 1999). Inhibition refers to the child's tendency to physically withdraw or to become anxious in an unfamiliar social situation. Negative emotionality refers to the child's tendency to become emotionally upset and includes crying, temper tantrums, or subtle expressions such as frowning faces. Activity level refers to the child's energetic gross motor activity, such as active/quiet play and difficulty/ease of controlling gross motor activity to complete a task. Task persistence refers to the child's attention and his/her ability to continue a task that is difficult (Martin & Bridger, 1999).

School Adjustment

School adjustment is a multidimensional construct that consists of personal and social indicators of the individual's ability to adapt to the school's demands and values, both the internal constraints and the external requirements (Bouffard, Roy, & Vezeau, 2005; National Research Council and Institute of Medicine, 2000). In this study, four indicators were used: adaptability, that is, the ability to adapt to new situations and unfamiliar persons or events; study skills, which emphasizes learning strategies, organizational skills, and aspects of achievement motivation; social skills, which emphasize interpersonal aspects of social adaptation; and leadership, that is, those behaviors that are associated with leadership potential. These indicators will be assessed using the adaptive scales of the Behavior Assessment System for Children-Teacher Rating Scales (BASC-TRS; Reynolds & Kamphaus, 1992) which includes the four

adaptive behavior components in a school context: adaptability, leadership, social skills, and study skills.

Academic Achievement

In this study, academic achievement is defined as the performance of students in specific subject matters. Academic achievement was measured using teacher reports on children's academic performance in four core subjects: reading or language arts, math, science, and social studies.

Children At-risk

Children at-risk are those who encounter adverse conditions that can negatively affect their healthy development. Table 1 indicates that the primary sources of risk include prenatal/perinatal stressors, individual condition, family circumstances, and environmental stressors. These factors increase children's risk of adverse outcomes, including greater likelihood of school failure and behavioral problems, which can have life-long negative effects. Three risk groups were examined in this study: children eligible for Title 1 programs, Special Education, and/or Homeless Education. Two methods were used to determine the risk group eligibility (a) identifying children based on categorical risk related programs as identified by the Virginia Department of Education regulations and local education agencies' policies, and (b) identifying children based on the developmental and health status of the children, their family configuration, and their residential status.

Table 1

The Primary Sources of Risk Factors

| Sources | Domains |
|--|---|
| Prenatal/perinatal stressors | Poor nutrition Health Care Perinatal drug exposure |
| Individual | Disability Psychological disorders Temperament characteristics |
| Family | Divorce Parental mental health illness Parenting style Parent educational level |
| School | Teacher quality Lack/low resources Negative school climate and relationships (peers, adults) |
| Community (Neighborhood, Society, Environment) | High violence Lack/low resources Transitions and mobility |

Note. From (Masten, 1994; Werner, 2000).

CHAPTER II

Review of the Literature

The purpose of this chapter is to provide a review of the theoretical and empirical research that is relevant to the present study. The first section addresses the target group of this research study (children at-risk), identifying their risk factors and outlining their predicted educational outcomes. Second, a conceptual framework that examines the relevance of the underlying resilience theory to the study of temperament and children's educational outcomes is illustrated. This is followed by a third major section, which includes the theoretical and empirical research about temperament. This third section begins with an overview of the construct of temperament and its models, providing its various definitions and its multiple dimensions. Next, a synthesis of the empirical research from the relevant literature about temperament influences on school adjustment and academic achievement is presented. Finally, a summary of the chapter is provided.

Children At-risk

Approximately one-third of the children in the United States are at risk for school failure before they even enter kindergarten (Lerner et al., 2003). Children at-risk are likely to have a single or multiple risk factors, which can cause serious problems early in life. The first years of children's lives, particularly from birth to age six are critical for their healthy development, so risk factors can have a significant impact on their development and their life outcomes (Lerner et al., 2003). Risk factors can be defined as significant, adverse conditions that have a negative or

potentially negative impact on children in ways that can impede or threaten their healthy development (Keogh & Weisner, 1993). Werner and Smith (1992) described risk factors as "biological or psychosocial hazards that increase the likelihood of a negative developmental outcome in a group of people" (p.3). Researchers (Edwards et al., 2007; Keogh, 2000; Werner, 2000; Zervigon-Hakes, 1995) have identified sources of early risk in children's lives and classified them into three categories: biological, familial, and environmental risk factors.

(a) Biological factors. Some of the biological conditions that have been associated with adverse conditions and difficulties include low intelligence, disability, and developmental delays. They also include prenatal/perinatal stressors (e.g., poor nutrition, poor health care, perinatal drug exposure), premature birth, low birth weight, and medical conditions that required prolonged hospital stays (Masten, 1994). These biological factors can reduce a child's ability to succeed, to be independent, and to become self-reliant in later life because his physical, cognitive, and emotional abilities challenge his ability to meet the demands of the environment, and, in particular, school.

(b) Family dynamics/status. Poverty or low income and negative social interactions within the family can have significant impact on a child's development. Children from poor families lack resources and are less likely to succeed educationally, have poorer jobs as adults, and have more adjustment problems than their middle class counterparts. Family interactions, such as parenting style, child abuse, divorce and the absence of one parent or both, affect children's socioemotional development. Other variables within the family can include maternal mental illness, parent substance abuse, disadvantaged minority status, large family size, and the lack or low level of one or both parents' education (Masten, 1994; Werner, 2000).

(c) Environmental factors. Early adverse experiences of children in school, neighborhood, or community can negatively influence their healthy development, if they have characteristics that increase children's risks. For example, detrimental variables in school include an unsafe school environment, unqualified teachers, inadequate materials and supplies, and frequent changes in staff/ staff absenteeism; ones in the neighborhood include high crime and a violent neighborhood; and those in the community include a low/lack of resources and low social/political commitment to children and education (Keogh, 2000; Masten, 1994; Werner, 2000).

These individual, familial, and environmental conditions suggest the possibility of potentially significant problems that can affect an individual at an early age and threaten his/her healthy development. Thus, the importance of identifying these risk factors lies in using them to predict potential outcomes so that interventions can be tailored to reduce negative effects and increase protective influences. Research has shown that certain risk indicators are antecedents of certain negative consequences and may be associated with significant problems at particular developmental periods. For example, elderly individuals may be at-risk for Alzheimer's disease, adolescent boys for delinquency, women for breast cancer, and young adults for drug and alcohol abuse (Keogh, 2000). Therefore, some of the predicted educational outcomes from childhood risk factors are described below.

Predicted outcomes. Research has shown that risk factors can significantly affect the academic and social behaviors of children. Academically, children at-risk are likely to have a poor academic performance particularly in the basic academic skills, such as reading and mathematics, and overall low academic achievement. Socially, children at-risk are more likely than typically developing children to fail to meet the expectations and demands of classroom

standards for adequate social behavior and have difficulties in relating to both peers and adults (Hamre & Pianta, 2005; Edwards et al., 2007).

Children at-risk often begin school lacking the readiness to meet the demands of the school environment. They may transition from a relatively unstructured home or child care to elementary school lacking the abilities needed to meet the expectations for self-regulation, such as the ability to appropriately communicate wants, needs, and thoughts verbally, to follow directions, and to be sensitive to other children's feelings (Blair, 2002). In addition, their parents' involvement in their education can be limited due to other problems in the family, such as financial distress, which can impose constraints on school visits and commitments of time and effort (Shonk & Cicchetti, 2001).

The academic and social behavior deficits that children at-risk are likely to develop can negatively influence teacher behavior toward these children. The teacher/student relationship is reciprocal; that is, positive student behavior elicits positive teacher behavior and negative student behavior elicits negative teacher behavior (Skinner & Belmont, 1993). Teachers tend to provide less positive attention, fewer praise statements, and more negative statements to children who exhibit inappropriate academic and social behaviors than to children who meet the academic and social behaviors expectations of the teacher (Gable, Hendrickson, Tonelson, & Van Acker, 2002; Miller, Gunter, Venn, Hummel, & Wiley, 2003; Van Acker, Grant, & Henry, 1996).

As a result, children at-risk can experience long term negative effects, such as increased school dropout rates and reduced graduation rates. These effects can be related to a number of negative social outcomes, such as becoming involved with the criminal justice system and having an increased likelihood of unemployment or of being employed at a low income level (Caspi et al., 1998; Hepburn & White, 1990). Individuals who do not possess a high school

diploma earned an average of \$23,556 annually, compared with \$32,136 for those with a high school diploma, and \$52,624 for those with a baccalaureate degree, based on data from Bureau of Labour Statistics (2008). Individuals with low income are likely to need support from publically funded welfare, health care, and other social services (Edwards et al., 2007; Rumberger, 1987).

In summary, research has found that risk factors are associated with and can predict negative academic and social outcomes both for the individual and for the society as a whole. These predicted negative outcomes include grade retention, chronic absenteeism, behavioral problems, elevated levels of delinquency, higher number of incidents of violent and aggressive behavior, teenage pregnancy, and greater degrees of psychological problems. Such negative outcomes can be transferred to the postschool years and into adulthood (Bemak, Chi-Ying, & Siroskey-Sabdo, 2005; Roderick, 1994; Kominski et al., 2001).

Although children who grew up in adverse conditions are more likely to exhibit problematic behaviors and negative outcomes in their later teen and adulthood years (e.g., substance abuse, teenage pregnancy, school drop outs, unemployment), research has also documented children at-risk who do not exhibit problematic behaviors but instead demonstrate relatively positive adjustment and success in developmental tasks and into adulthood (Haskett, Nears, Ward, & McPherson, 2006). Werner (1982) called these well adjusted children with significant risk factors resilient. Resilient children had personal, familial, and environmental characteristics which interacted with each other and served as protective factors by ameliorating/resisting the potentially negative influence of risk factors (Werner, 1982).

These findings of positive outcomes in children at-risk have led researchers to shift the focus of empirical work about risk factors to identifying underlying protective factors that

increase positive effects and minimize potential negative impact of risks, with a goal of understanding how to increase the healthy development of children. While risk factors create adverse conditions for the healthy development of the individual, protective factors are those which “moderate the effects of individual vulnerabilities or environmental hazards so that the adaptational trajectory is more positive than would be the case if these protective factors are not operational” (Masten, Best, & Garmezy, 1990, p. 426). Werner (1995) has identified three contexts for protective factors:

(a) Personal strengths. Research has found that individual characteristics, personality, and temperament play a significant role in protecting children who are in adverse conditions. Common strengths of individuals that have been identified across studies are (a) the ability to use flexible coping strategies in various adverse situations, (b) a reflective cognitive style rather than an impulsive one, (c) an internal locus of control, which refers to an individual's ability to influence their environment positively, and (d) positive intrapersonal relationships, including being outgoing, being liked by peers and adults, and having a positive self-concept (Werner, 2000).

(b) Family context. Research has also indicated that the family can be a protective factor for children at-risk, if the family is able to provide the child with a certain quality of family interactions, such as (a) establishing a close bond with an emotionally stable parent or at least one person within the family (e.g., grandparents, siblings) who can provide stable care and an adequate amount of attention during the first year of life, (b) the level of education of the parents, in particular the mother, and their positive parenting style, (c) if the child is given a responsible role within the family (e.g., taking care of younger siblings, managing the household), and (d) having faith, that is, a sense of coherence that provides stability and meaning

to their lives and a conviction that their lives have meaning and that things will be better if the person hopes and believes (Werner, 2000).

(c) **Environmental context.** Research has found that school, neighborhood, and the community can provide continuing emotional support that comforts and counsels a child at-risk. These supportive relationships can be found in (a) positive school experiences, in which teachers are nurturers and mentors, (b) developing friendships in the school and neighborhood, and (c) being involved in the community by having access to community resources which make quality use of the children's time and provide relationships with adults, such as being involved in organized sports and/or spiritual activities (Kumpfer & Summerhays, 2006; Werner, 2000).

Therefore, the sources of protective factors are also the sources of risk factors, or as Keogh (2000) described it, protective factors are the *flip side* of risk factors. Protective factors are effective in response to risk factors and the two kinds of factors do not function independently, but affect each other and also interact with the context. For example, a child with an identified disability in a family context that provides authoritative parenting, is characterized by warmth, respect and support for the child, has open communication and encourages independence is more likely to experience positive outcomes than is a child in a family context that utilizes permissive parenting in which there are few demands to regulate their emotions and behaviors.

In ways that are similar to child-family interactions, the interactions of a child's characteristics with the school's demands and values have significant effects on the educational and behavioral outcomes of children at-risk. For instance, a child's temperament can either be a risk or a protective factor when the child encounters the classroom's demands for academic and social behaviors. That is, temperament profiles of high persistence and low activity level serve

the child as protective factors when there is an expectation that the child will complete a task such as solving a math problem; whereas temperament traits of negative emotionality and impulsivity can be risk factors when there is an expectation that the child will follow classroom rules. Thus, the interaction between the child and the environment can either ameliorate or intensify the outcomes for children (Keogh, 2000).

Conceptual Framework

This present study of temperament and its relationship to school adjustment and academic achievement is based on resilience theory (Werner, 1971, 1982) and its implications for prevention interventions for children at-risk. Resiliency was first examined by research in the area of psychopathology in an attempt to understand childhood disorders, in particular, to explain the absence of pathology in individuals who had potential risks for developing a psychological disorder. In the 1970s, Werner initiated a longitudinal study of children at-risk from the prenatal that continued into adolescence. The participant children were in Kauai, Hawaii and grew up surrounded by risks such as poverty and/or alcoholic or mentally ill parents. The results showed that two-thirds of the children exhibited destructive behaviors in their later teen years (e.g., substance abuse, teen pregnancy). One-third of the participant children, however, did not exhibit the problematic behaviors that the other children did. Werner concluded that children who were able to overcome the predicted negative outcomes of their risky environment were resilient.

Resilience has been defined as “good adaptation under extenuating circumstances” (Masten & Reed, 2002, p. 76). Children who are resilient are adaptive under adverse conditions, able to select coping strategies that result in positive outcomes despite the risk factors that surround them (Dent & Cameron, 2003).

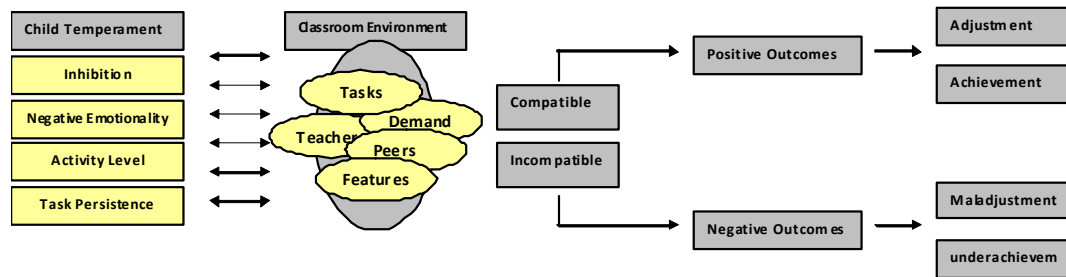
Children's temperament can present potential risks or protective factors for healthy development. Figure 1 visually depicts a conceptual framework of temperament as a risk or a protective factor along with the potential educational outcomes. Certain temperament profiles have been identified as "difficult temperaments" which can predict adjustment problems and difficulties for the individual in later life (Thomas & Chess, 1977). For example, temperament traits such as high activity level, negative emotionality, and impulsivity can create stressful situations for the child as well as the teacher in that the child struggles and may not be able to meet the academic and social behaviors demands of the classroom. However, a child with an "easy temperament" tends to have low negative emotionality and low activity levels, both of which allow him/her to meet teachers' expectations for being on-task and compliant with classroom rules (Guerin, Gottfried, Oliver, & Thomas, 1994; Keogh, 1982, 2003; Martin, Drew, Gaddis, & Moseley, 1988; Mevarech, 1985).

However, the resilience theory implies that not all children with difficult temperaments develop maladjusted behaviors and have negative educational outcomes. The classroom context can represent a source of a risk or protective factors as well. According to the resilience theory, a child with a difficult temperament can adjust to the demands of the environment with appropriate support. If the child's temperament is compatible with the environment's features and demands, the child can be well adjusted and, therefore, academically and behaviorally competent and more likely to succeed. The interaction between the child's temperament and the classroom environment is essential if educators are to help children to overcome their risk factors, be academically and behaviorally competent and eventually succeed in school and life. The interaction between a child's temperament traits and the demands and values of a classroom can either ameliorate or intensify outcomes for the child. This interactional approach emphasizes

the *goodness-of-fit* concept (Thomas & Chess, 1977), in which there has to be a good fit between the temperament of the child and the requirements of the environment in order minimize the potential negative effects of the risk factors.

Figure 1

Conceptual Framework of Temperament as Risk or Protective Factors & Educational Outcomes



Temperament

Several theories about child temperament have emerged in the literature and have shaped models of temperament that define it and identify its traits. Although there is not consensus about the definition of the term *temperament* and its traits differ across models, there are several constructs that almost all models include, specifically that temperament (a) has a biological root, (b) appears early in life and can be identified as early as infancy, and (c) is characterized as behavioral tendencies rather than discrete behavioral acts (Goldsmith et al., 1987). Although several models of temperament exist in the literature, for the purpose of this study only four models are described: the clinical model by Thomas and Chess (1977), the developmental model by Rothbart and Derryberry (1981), the emotionality-activity-sociability (EAS) model developed by Buss and Plomin (1975; 1984), and the inhibited and uninhibited temperaments model by Kagan and his colleagues (Kagan, 1988; Kagan, Kearsley, & Zelazo, 1978). Each of those models identifies dimensions of temperament. In general, most of the temperament dimensions

exist in most of the models but were labeled differently, as will be presented throughout the paper. For instance, reactivity can be referred to as negative emotionality in some models, and inhibition is sometimes referred to as approach/withdrawal (Nelson, Martin, Hodge, Havill, & Kamphus 1999; Sanson et al., 2009). Additionally, the terminology that refers to temperament dimensions varies across the studies, in that different researchers used different terms for the same thing, for example using temperament traits, temperament characteristics, or temperament dimensions to refer to the same concept. Thus, the investigator in this current study uses those terms interchangeably.

The first two models (the clinical and the developmental) are widely used in the literature about temperament in educational settings (Zentner & Bates; 2008); however, these four models were found to be the basis for all the empirical studies that are included in the literature review in this present study.

The clinical model. In this model, the definition of temperament is the one that was described above as a behavioral style that is concerned with *how* a child responds to a situation. This is not a matter of *why* or *what* as *why* refers to the purpose or motivation of an action and *what* refers to the content of or ability to perform a task/ behavior.

Temperament studies emerged as Thomas, Chess, and their colleagues (Thomas, Chess, & Birch; 1968; Thomas & Chess, 1977) aimed to understand the influence of individual differences on maladaptive behaviors beyond parenting and environmental factors, which until then had been the commonly used approach to indicate causes of child problem behaviors. Thomas and Chess and their colleagues questioned cases such as behavioral differences among children from the same family who grew up in the same environment, children who exhibited maladaptive behavior even though they had committed parents, and the well adjusted child who

is at-risk for maladaptive behavior. Their observations indicated that parenting styles and the environment alone were not sufficient to explain the maladaptive behaviors of the children they examined. Therefore, the New York Longitudinal Study (NYLS; Thomas & Chess, 1977; Thomas et al., 1968) was initiated in 1956 to investigate the significance of the role of the child's characteristics, specifically his/her temperament, in individual adaptive/maladaptive behaviors as well as the interactions between the individual and environmental factors.

The NYLS was a pioneering study in the area of temperament. This study examined 131 children and 85 families from the age of 3 months to adulthood, using various measures to assess the children's temperament. These measures differed according to the participants' age and included parental reports about their infants' reactions to everyday situations, teachers' reports on their students, behavioral observations, psychometric techniques, and self-reports during adolescence and adulthood. In the initial investigation, Thomas and Chess (1977) examined the individual differences in the behavior of infants from the age 3 to 6 months using an observations method and interviewed the parents about the behavior of their infants in different contexts. The patterns of the infants' behaviors were coded into categories of nine dimensions: activity level, regularity of sleeping and eating patterns, initial reaction, adaptability, intensity of emotion, mood, distractibility, persistence and attention span, and sensory sensitivity (Thomas & Chess, 1977).

In addition, three typologies were developed to describe the temperament of a child; these are: the difficult child, the easy child, and the slow-to-warm-up child. The difficult child was described as showing behaviors associated with a negative mood, withdrawal, low adaptability, high intensity, and low regularity; in contrast the easy child exhibited a positive mood, adaptive reactions to new situations, and mild to moderate intensity; the third typology was the slow-to-

warm-up child who was found to display a mildly negative response to new situations and a slow adaptability to change. These typologies, however, received criticism from researchers (Putnam, Sanson, & Rothbart, 2002; Rothbart, 1982), who pointed out some problems that are associated with this categorization of children as it uses value-laden terms that are imprecise. Rothbart elucidated the concept that a behavior that can be described in one situation as difficult may not be difficult in another situation.

Thomas and Chess (1977) emphasized two concepts in this temperament model: (a) the interactional approach, that is, a child's behavior is a result of the interactions of various influencing factors (temperament, parenting styles, and environmental factors); and (b) the *goodness-of-fit* concept in which there has to be a good fit between the temperament of the child and the requirements of the environment. Subsequent research on the NYLS tended to use shortened lists of the NYLS temperament traits, as factor analyses have shown that there is certain redundancy among the temperament traits (Zentner & Bates; 2008) and theoretical frameworks have indicated that fewer than nine dimensions can account for temperament variability (Rothbart & Mauro, 1990).

The developmental model. This model was developed by Rothbart and Derryberry (1981). Emotion and emotion regulation are the focus of this approach in which a strong emphasis is placed on attentional and neurobiological mechanisms (Zentner & Bates, 2008). Temperament for this model is defined as constitutional differences in reactivity and self-regulation. Constitutional refers to biological differences and is influenced by heredity, maturation, and experience over time. Reactivity refers to biological arousability (responses) to changes in the environment that can be measured by a threshold of reactivity, latency and intensity of an individual's reaction, rise time, and recovery time. Self-regulation refers to the

ability to modulate (regulate) their biological arousability (reactivity) and is the ability to utilize effortful control in situations to regulate the biological arousability. It includes a high level of attention, being able to approach and attempt to solve a problem as opposed to withdrawing or seeking comfort/excitement. As Rothbart and Derryberry explained, self-regulation is a process that an individual utilizes in various situations in order to “increase, decrease, maintain, and restructure the patterning of reactivity in either an anticipating or correctional manner” (Rothbart & Derryberry, 1981, pp. 51-52).

Accordingly, three dimensions of temperament have been identified (a) *surgency-extraversion*, which is composed of facets such as positive anticipation, activity level, and sensation seeking; (b) *negative affectivity*, which includes fear, anger-frustration, and social discomfort; and (c) *effortful control*, which includes facets such as inhibitory control, attentional focusing, and perceptual sensitivity (Posner & Rothbart, 2007; Rothbart & Bates, 2006).

The Emotionality-Activity-Sociability (EAS) Model was developed by Buss and Plomin (1975; 1984). In this model temperament is defined as a set of inherited traits which appear early in life (the first two years of life), are genetically based, and are stable over time. Three dimensions of temperament are identified according to this theory: (a) emotionality, which refers to the tendency to be aroused by unpleasant emotions, (b) activity, which refers to the energy level, tempo, and rate of a response, and (c) sociability, which involves the tendency to desire to be with others versus being alone. Each of the dimensions is considered to be independent from the others and to be the foundation for the development of individual personalities throughout life (Kristal, 2005). Two questionnaire measures have been developed based on this model: the Colorado Child Temperament Inventory (Rowe & Plomin, 1977), and the EAS Survey for

Children (Buss & Plomin, 1984), which examine three dimensions of temperament: emotionality, activity, and sociability.

The fourth model of temperament was developed by Kagan and his colleagues. This model differs from the other models because it is a monodimensional approach, with one temperament dimension, inhibition vs. uninhibition. This dimension focuses on a child's reaction to an unfamiliar situation, to which a child may be shy, reserved, and/or withdrawn, or s/he may be sociable, affectively spontaneous, and approaching. Each type refers to a class of children who share a genotype, an environmental history, and a set of correlated behavioral and physiological characteristics (Kagan, 1988). Similar to the other models, Kagan defined temperament as a biologically based behavior that is inherited and presents in infancy. It has behavioral, genetic, and physiological patterns that pertain to both categories (inhibition/uninhibition). Kagan and his colleagues conducted several longitudinal studies to support the influence of biological factors on individual differences. One of their longitudinal studies began with three month old Chinese and Caucasian children, investigating the effects of day care over two and half years. The findings indicated that Chinese children were more subdued, shy, and fearful when they met unfamiliar adults or children. They also tended to cry more intensely than Caucasian children when their mother left them for a brief separation. Thus, researchers concluded that the Chinese children differed in behavioral characteristics from the Caucasian children, with same patterns of behaviors appearing whether they attended day care or not (Kagan, Kearsley, & Zelazo, 1978).

Children's temperament in schools. The major studies that examined temperament in educational settings were performed by Barbra K. Keogh and her associates (1982, 1986, 1989) and Roy Martin and his colleagues (1984, 1985, 1988, 1994). Their work started in the early

1980s based on the nine dimensions of temperament identified by Thomas and Chess (1977). While Martin and his colleagues (1984) developed a temperament measure for the use in school settings that addresses six temperament dimensions that were consistent with Thomas and Chess's nine dimensions, Keogh, Pullis, and Cadwell (1982) abbreviated the nine temperament dimensions of Thomas and Chess into a short form to be used in school settings. In this short form measure, Keogh et al., extracted three common temperament factors from the nine NYLS dimensions. Those temperament factors are: task orientation, personal-social flexibility, and reactivity. Task orientation consists of low activity, high persistence, and low distractibility; it represents actions that are effective in modulating behavior to accomplish a task. Personal-social flexibility consists of adaptability, approach-withdrawal, and positive mood. This is characterized as pro-social components, such as being adaptable, friendly, and easy to work with. Reactivity consists of intensity, threshold, and negative mood. This is a negative factor that is characterized by irritable behavior, overreaction, and intensity (Keogh et al., 1982; Keogh, 1989, 2003).

The significance of understanding a child's temperament in relation to schools can be explained by highlighting the three following related areas: the goodness of fit, the relationship between temperament and behavioral disorders, and the relationship between temperament and educational outcomes.

The goodness of fit. The role of the interaction between an individual's characteristics, especially between his/her temperament and the environment, was introduced by the concept of *goodness of fit* (Thomas, Chess, & Birch, 1968). The classroom environment must be compatible with a child's temperament traits for the child to have optimal development. The environment should work with, not against, the child (Kristal, 2005). If goodness of fit exists

between the demands and expectations of the environment and the child's temperament, healthy development will occur. For example, a child with high level of activity tendencies can be given ways to release his or her energy in an acceptable manner such as giving this child some responsibilities that require movement in the classroom (e.g., take some books to the library, collect the homework from peers). If this child with high level of activity were to be required to sit still disregarding his or her temperament, this child may act out, become anxious and out of control (Kristal, 2005). However, this concept of goodness of fit should not focus mainly on teachers making all the needed modifications in the environment in order for the child to succeed. The children need to have a role in changing their behavioral patterns as well, and they must take responsibility for learning and managing their own behaviors. Therefore, children also need to be aware of their behavioral tendencies and learn how to monitor and regulate their emotions and behaviors. Thus, the concept of goodness of fit may include teaching children self-regulatory skills based on their individual needs. For instance, a child who is very persistent in his demands can learn to delay his or her desires in situations requiring delay (Kerns, Esso, & Thompson, 1999; Kochanska, et al., 2000).

Temperament and behavioral disorders. Temperament is, as previously described, an inborn tendency to behave in a certain manner that is considered to be within the normal variation in behavioral patterns between individuals. Individuals' behavioral tendencies shape their behavioral patterns as they respond to various situations. Certain temperament characteristics can be similar to symptoms of emotional and/or behavioral disorders. For instance, the following disorders have been shown to share similar characteristics with temperament: obsessive-compulsive disorders (OCD), bipolar disorder, Asperger's syndrome, attention-deficit/hyperactivity disorder (ADHD), conduct disorder, anxiety disorders,

oppositional defiant disorder (ODD) and childhood depression (Kristal, 2005). To illustrate, a child with Asperger's syndrome tends to have problems in social situations; s/he can have difficulties in social interactions, exhibit stereotypical behavior, and evidence restrictions in interests and activities. However, those behaviors can also be explained as typical of certain temperament traits. For example, the temperament traits of low sensitivity and withdrawal can account for negative social interactions. High persistence and low distractibility can explain the overly focused behavior on one task regardless of the context and the environment's demands. Slow adaptation can indicate the individual is fixating on routine or order (Kristal, 2005). In general, a disorder-based behavior tends to be more frequent, and more intense than a temperament-based behavior, for which even extreme patterns fall within the bounds of normality (Kristal, 2005).

Research has shown that temperament is a biological risk factor that can lead to developing maladaptive behaviors and pathologies. Individuals with extreme approach tendencies or deficits in attention are at increased risk for the development of externalizing disorders such as conduct problems and hyperactivity (Rothbart et al. 1995; Rothbart and Bates 2006). Negative emotionality and the tendency to withdraw from social situations have been found to influence social competence, and the development of both internalizing and externalizing disorders (Rothbart & Bates 2006; Rothbart et al., 1995).

In addition, Chess and Thomas (1999) indicated that a poor fit between a child's temperament and the environment can lead to dysfunction or pathological functioning. Research has shown that temperament is associated with and can, at early ages, predict pathologies. Certain temperament profiles have been associated with and shown to influence the development of psychopathologies such as anxiety, depression, and ADHD (Rothbart et al. 1995; Goldstein &

Schwebach, 2004). For example, Schwartz, Snidman, and Kagan (1999) examined seventy-nine 13 year old adolescents and found significant association between earlier identification of inhibited temperament and later development of social phobia. Forty-one adolescents who had been classified as inhibited at age of two had developed social phobia by the age of 13. Likewise, Cote (2009) found that difficult temperament at five months was one of the two most important risk factors for atypically high levels of depressive and anxiety symptoms later in life. The other primary risk factor was maternal lifetime depression. Cote's findings were in line with previous research (Bosquet & Egeland, 2006; Guerin, Allen, & Craig, 1997) that indicated that difficult children's temperament is associated with and predicts depression and anxiety symptoms.

Temperament and educational outcomes. Research has shown that temperament has a significant relationship to school adjustment and academic achievement (for details on these findings see the synthesis of the literature later in this chapter). Certain temperament traits have been shown to be associated with higher levels of academic achievement and school adjustment. For example, children with high persistence and low activity levels tend to have high levels of academic achievement, and children with low levels of negative emotionality tend to be well adjusted to schools (Lavin-Loucks , 2006; Martin et al., 1988).

However, the interaction between a child's temperament and the classroom context can also influence educational outcomes. Considering children from an ecological perspective that acknowledges both the individual and interactive roles of multiple factors that exist in the environment is necessary. For instance, studies show that the interaction between the child's temperament traits and the classroom context influences the teacher's attitudes, interactions, and decisions as well as the child's school adjustment and academic achievement. A child's

intelligence is often overestimated for children with temperament traits that are perceived as positive, and underestimated for children with traits that are seen as negative (Pullis & Cadwell, 1982). For example, a child who is inhibited is often academically underestimated; whereas higher task orientation in children often influences teachers' assigned grades (Martin et al., 1988). Teachers' behaviors towards children with different temperament profiles tend to differ systematically. For instance, Pullis and Cadwell (1982) examined the influence of children's temperament traits on teachers' decision strategies. Their findings showed that a consistent significant relationship existed between children's temperament traits and teachers' classroom decisions. In particular, teachers used task orientation information across classroom management decision-making situations, that is, a child with a higher level of task orientation was less monitored for inappropriate or disruptive behaviors than a child with a low level of task orientation. Similarly, Nelson (1987) found that children's temperament significantly correlated with the amount of time that teachers spend with children, the frequency of teachers' praise and criticism, physical contact, and directive behaviors. Specifically, a high level of activity was positively correlated with redirection, and a high level of persistence was positively correlated with child-initiation. Positive mood and adaptability were negatively correlated with teacher redirection.

Synthesis of the Literature

For the purpose of this study, the literature on temperament and school adjustment, as well as, temperament and academic achievement will be reviewed and discussed in the following section.

Temperament and school adjustment

Search strategy. Two search strategies were used to identify articles for this review. First, a computer search of seven electronic databases was conducted (Academic Search Complete, Education Research Complete, ERIC, PsycARTICLES, PsycINFO, Psychology and Behavioral Sciences Collection, and Teacher Reference Center). At the outset, the investigator searched the electronic databases using the keywords *Temperament AND Adjustment* and *Temperament AND Adaptability*, however, the search was too broad, resulting in too many papers that did not relate to this study. Therefore, two more words, *School* and *Classroom*, were added to the search, in order to find studies in educational settings that would be relevant to the present study. Two searches were done using the word *School* in one and *Classroom* in the other and combining each of these with the terms mentioned above to ensure that the search covered all of the possible combinations of the terms *Temperament*, *Adjustment*, *Adaptability*, *School*, and/or *Classroom*. After completing the initial search, an ancestral search of all the articles that had initially been identified was conducted to obtain additional studies not found through the original computer search.

Selection criteria. Studies were selected for this review based on the three following inclusion criteria, which were chosen because of their relevance to the present study (a) the studies must be English language, empirical, peer-reviewed, published articles; (b) the studies must have been published between 1999 and 2009, in order to ensure that the current literature was being examined. The investigator of this research consulted with experts in this field who agreed that using the last ten years as current literature would be appropriate; and (c) the grade levels examined were pre-kindergarten - 12th grade because this research project is designed to

investigate a school-age population. Therefore, research on infants and college-aged students was not included.

Search results. Of the 71 articles found, only nine studies met the selection criteria and were included in this review. Table A through Tables B6 (see Appendices A and B) outline the characteristics of the reviewed studies. The investigator of this present study reviewed the research studies by methodologies which included discussions of participants, settings, independent and dependent variables, instrumentation, research designs, and results. This methodology literature review serves three purposes (a) to evaluate the current condition of and trends in the relevant literature, (b) to provide explanations or justifications of any variances in the findings, if they exist, and (c) to identify gaps in the existing literature that may need further investigation for future research directions.

Participants and settings. Table A (see Appendix A) summarizes the demographic information about the participants and settings. In the studies, with one exception (Reed-Victor, 2004), the majority of the participants were Caucasians, with fewer than 20% of the participants in each study being children of other ethnic backgrounds (e.g., African Americans, Hispanic, Asians, other). Six of the nine studies reported that the children were from the middle and/or upper middle class (Blair, Denham, Kochanoff, & Whipple, 2004; Chen, Chen, Li, & Wang, 2009; Liew, Eisenberg, & Reiser, 2004; Nelson, Martin, Hodge, & Kamphaus, 1999; Prior et al., 2001; Sanson et al., 2009). Two studies included children at-risk (Bouffard et al., 2005; Prior et al., 2001; Sanson et al., 2009) and one study (Reed-Victor, 2004) primarily examined children with special needs (e.g., special education, Title 1, homeless education).

All the reviewed studies examined temperament and school adjustment in early childhood; six of them also followed the child participants for two, three, four, or five years into

middle or late childhood/adolescence (Blair et al., 2004; Bouffard et al., 2005; Chen et al., 2009; Nelson et al., 1999; prior et al., 2001; Sanson et al., 2009). Two of those studies (Prior et al., 2001; Sanson et al., 2009) used data that was derived from the Australian Temperament Project (ATP), a large-scale prospective longitudinal study of children's temperament and development. The ATP began in 1983 by examining 2,443 infants at 4–8 months of age from urban and rural areas of the state of Victoria, Australia. Families have been followed up in surveys at approximately 18 month intervals since the first year of life (Sanson et al., 2009).

Studies were conducted in a variety of settings, including different countries and different geographical regions. Seven studies were conducted in urban areas of the United States (Blair et al., 2004; Liew et al., 2004; Nelson et al., 1999; Reed-Victor, 2004); two studies were conducted in urban areas of Canada (Bouffard et al., 2005; Coplan, Bowker, & Cooper, 2003); two studies were conducted in suburban/rural areas in Australia (Prior et al., 2001; Sanson et al., 2009); and one study was conducted in urban areas of China (Chen et al., 2009). The reviewed studies were conducted in public schools, and/or childcare settings, with two studies (Liew et al., 2004; Chen et al., 2009) using laboratories as well.

Dependent variables. School adjustment was the dependent variable in all of the reviewed studies. Multiple terms were used to indicate school adjustment in educational settings, some of which were: *school adjustment*, *behavioral adjustment*, *social adjustment*, *emotional and behavioral adjustment*, *socioemotional adjustment*, or *adjustment*. Only three studies (Bouffard et al., 2005; Coplan et al., 2003; Reed-Victor, 2004) provided a specific definition for school adjustment, however, all studies agreed about the basic meaning of school adjustment. Two approaches were used to indicate school adjustment: behavioral skills and/or personal traits. The behavioral skills approach focused on the behavior and it can be prosocial

behaviors such as approaching a problem or behavior problems such as internalizing or externalizing behaviors. The personal trait approach was employed less frequently, focused on the emotion of the child such as insecurity (Bouffard et al., 2005). In general, school adjustment was used to refer to the child's ability to adapt emotionally and/or behaviorally to the demands, features, and values of the school environment.

Independent variables. Child temperament was the independent variable in all the reviewed studies. As discussed above, temperament includes a multiplicity of temperament dimensions, which have been clustered and measured differently by various researchers, however, most of the temperament dimensions are fundamental components of most models of temperament. Nelson et al. (1999) and Sanson et al. (2009) pointed out that a temperament dimension can exist in different models but with different labels. For example, reactivity can be referred to as negative emotionality in some models; and inhibition is sometimes referred to as approach/withdrawal. The reviewed studies primarily used the four models that were discussed previously in this chapter. A discussion of the temperament dimensions used in each study is described in the measurements section based on the temperament measure employed.

Measurements. Two variables were measured in the reviewed studies: the children's temperament and their school adjustment.

Children's temperament. As previously noted, temperament includes multiple dimensions, which are clustered and measured differently by researchers and also used depending on what was appropriate for the specific developmental level of the children. Temperament was primarily measured using standardized rating scales. Ten standardized questionnaires were used across the reviewed studies assessing multiple temperament dimensions, and only one study (Chen et al., 2009) utilized observational coding systems to

assess children's temperament. Tables B1 through B6 (see Appendix B) outline the measures and the assessed dimensions of temperament. For the purposes of this current study, the 11 measures, including the observational method, were carefully assessed and subsequently grouped into four categories, based on the theories or models that had served as the foundation for developing the measures in each study. By examining each instrument by which the various studies assessed the children's temperaments, the investigator of this present study found that all the measures were based on one of the four models of temperament that were described above. However, the researchers of the reviewed studies used factor analyses to reduce the number of the temperament dimensions that exist in the original models for the purposes of their particular study and for psychometric and theoretical reasons.

Five studies (Bouffard et al., 2005; Nelson et al., 1999; Prior et al., 2001; Reed-Victor, 2004; Sanson et al., 2009) used measures that the researchers developed based on Thomas and Chess's (1977) clinical model of temperament. Specifically, Bouffard et al. (2005) examined five temperament dimensions: activity level, distractibility, adaptability, rhythmicity, and emotional reactivity. Nelson et al. (1999) and Reed-Victor (2004) each employed four dimensions of temperament, both using activity, emotional intensity, and persistence, but with Nelson et al. adding adaptability and Reed-Victor employing inhibition as different fourth dimension. Prior et al. (2001) and Sanson et al. (2009) examined multiple dimensions of temperament at various age levels of the participating children using several different standardized questionnaires. The dimensions they investigated were: task orientation, flexibility, and reactivity for ages seven and eight, but approach, cooperation, rhythmicity, irritability, reactivity, persistence, and distractibility for ages one to three.

Two studies (Blair et al., 2004; Liew et al., 2004) utilized measurements based on Rothbart and Derryberry's (1981) developmental model. Both studies examined two dimensions of temperament: negative emotionality and effortful control in the participating children. Two studies (Coplan et al., 2003; Prior et al., 2001) adopted measures that were based on the emotionality-activity-sociability (EAS) model that Buss and Plomin (1975, 1984) developed. Coplan et al. and Prior et al. investigated the same constructs of shyness, negative affect, and activity/inattention, but the latter added an additional trait, sociability, to the three dimensions. The single study (Chen et al., 2009) that employed an observation coding system assessed only one temperament dimension, inhibition, based on Kagan's model of temperament, which measures inhibition/uninhibition.

Five studies also utilized assessments reported by parents (Blair et al., 2004; Bouffard et al., 2005; Coplan et al., 2003; Nelson et al., 1999; Sanson et al., 2009). Another study (Reed-Victor, 2004) included the teacher's assessment, and two studies (Liew et al., 2004; Prior et al., 2001) used both parents' and teachers' ratings of the children's temperaments in order to increase the reliability of and minimize the bias in their data. Liew et al. (2004), in addition to the parent and teacher reports, included peer reports of a classmate's temperament.

School adjustment. Similar to the measurement of temperament, school adjustment was measured using various measures along with multiple methods and informants. Tables B1 through B6 (see Appendix B) outline the measures of school adjustment. Two studies employed reports by both parents and teachers (Bouffard et al., 2005; Sanson et al., 2009). Two other studies (Chen et al., 2009; Coplan et al., 2003) included observations of children during play as well as teachers' reports with Chen et al. (2009) also including interviews with the participant children. Liew et al. (2004) and Prior et al. (2001) included three informants about each child's

adjustment: parent and teacher reports in both cases, plus a peer report or a self-report, respectively. Two studies (Nelson et al., 1999; Reed-Victor, 2004) utilized teacher ratings of the children's adjustment. The use of multiple sources of information has the advantage of providing more reliable data and minimizing the effect of the informants' biases. A discussion of interrater differences/agreements in teacher, parents and peer reports will be provided below in the results section.

Although school adjustment was not explicitly defined in each study, as described above, the components of the measures are almost the same in all the studies, with some variations in their subscales. The measurement scales for school adjustment included three components: school competence, social competence, and behavior problems.

The school competence scales included academic attitude and behaviors, such as school performance, study skills, and participation in learning. In addition, they measured learning and performance problems, such as attention difficulties. The social competency scales measured prosocial behaviors, which included the children's cooperative behavior, their adaptability, approach, sensitivity, and popularity among peers. The behavior problems scales primarily measured externalizing behaviors, that is, those which are directed outward and are disturbing to the others in the social environment, such as aggression, disruption, conduct problems and/or impulsivity/hyperactivity. Internalizing behaviors, that is, those which are directed inward, are disturbing to the individual, and represent problems with self (Gresham & Kern, 2004), such as withdrawal, negative perfectionism, insecurity, and/or avoidant behaviors in social situations, were measured less frequently.

Several researchers, (Blair et al., 2004; Chen et al., 2009; Coplan et al., 2003; Nelson et al., 1999), have brought up concerns about the potential overlap in content between the measures

of the children's temperament and their school adjustment. For instance, Coplan et al. (2003) obtained data on school adjustment by making observations about children's behaviors during free play to broaden their assessment of each child adjustment, and minimize any overlap that may occur if the reporters had to report on the two examined variables. Similarly, Chen et al. (2009) used an observational method to obtain data on inhibition as a temperament dimension while employing teacher and peer reports about school adjustment. Chen et al. also, pointed out that the items in the original competence measure involved several highly overlapping areas. In a previous research of Chen, Rubin, and Li (1995), factor analyses of the data showed that the overlapping items indicated a single competence factor. Thus, consistent with the approach in the previous study and to avoid items overlapping, Chen, et al. used only a global score of school-related competence.

Blair et al. (2004) created two new subscales by removing items from the social competence measure if they contained a word that could be considered an emotion word that could be related to temperament. In that manner, they were able to create a new scale for externalizing behaviors that excluded any items that refer directly to anger as well as a new internalizing scale that used only items that did not directly refer to sadness and anxiety. This procedure had also been used in earlier research (Denham, Cook, & Zoller, 1992).

Nelson et al. (1999) acknowledged that they made no attempt to determine if overlap in the constructs existed during data collection; however they pointed out that the only possible overlap that might exist was between the *Adaptability* scale in the school adjustment measure of the Behavior Assessment System for Children (BASC; Reynolds & Kamphaus, 1992) and the *Adaptability* scale on the temperament measure the Temperament Assessment Battery (TAB; Martin 1988). Nelson et al. explained that since the results of the path analysis showed that the

positive social behavior which included *adaptability* did not differ from zero, the effects of the common items' content did not seem relevant. Additionally, they argued that the BASC items were more situation-specific, that is, related directly to aggression, conduct problems, or hyperactivity in specific situations; whereas the emotional intensity of temperament was a trait that was based more on the general characteristics of the child.

Research designs. All the reviewed studies were quantitative, non-experimental, correlational designs. Six of the studies collected longitudinal data by following the participating children for two to five years (Blair et al., 2004; Bouffard et al., 2005; Chen et al., 2009; Nelson et al., 1999; Prior et al., 2001; Sanson et al., 2009). Although longitudinal data can provide strong support for the results of developmental studies because the researchers track developmental progress and/or stability over time, the internal validity of these studies can be threatened by participant attrition. Even more likely is the fact that a systematic loss of certain types of participants can occur; such a systematic loss can affect the findings of the studies. This attrition threat was addressed in several of the reviewed studies. For instance, Blair et al. (2002) conducted *t*-tests comparing their sample with two earlier samples as to demographic and study variables. They found no significant differences in mean levels across the samples, so they concluded that their low continuing participation rate did not result in bias. Sanson et al. (2009) found that the lost participants were from a lower socioeconomic status (SES) than the retained participants and that the loss was among ethnic families. However, the researchers explained that the overall SES profiles of the original and retained samples were very similar. For example, the mean scores for the fathers' and mothers' occupations were 3.05 and 3.06 (on a 6-point scale), respectively, in the original sample, and the retained mean scores of 11–12 years old were 2.99 and 2.97.

Prior et al. (2001) conducted several *t*-tests of the participants who had missing data and were excluded from the study. The researchers compared the excluded data with the examined participants' data; and found no significant differences over a range of child and family characteristics.

Results. The findings of the reviewed studies are presented in three categories (a) a significant relationship between temperament and school adjustment, (b) the influence of demographic variables, specifically age, gender, ethnicity, and/or socioeconomic status, and (c) interrater differences, which includes differences between parents, teachers, and/or peers' reports.

Significant relationships. Several dimensions of temperament were investigated across all the reviewed studies (see the measurements section for all the examined dimensions). Of these, negative emotionality was found to be the most significant predictor of concurrent and later school adjustment. Negative emotionality has been shown to be a fundamental dimension of temperament in most research (Nelson et al., 1999), including the four major models of temperament that were discussed in the temperament section above. Other terms, such as reactivity, emotionality, irritability, anger, or proneness to general distress (Sanson, Hemphill, & Smart, 2004), were used by some researchers to refer to negative emotionality. Children with negative emotionality manifest intense crying or anger in response to frustration, prolonged emotional upset as a result of changes in plans, and a general tendency toward irritability (Nelson et al., 1999). Thus, negative emotionality would be expected to be associated with both internalizing and externalizing problems (Brendgen, Wanner, Morin, & Vitaro, 2005; Hagekull, 1994; Nelson et al., 2009) and with poor social skills (Eisenberg et al., 1993; Murphy, Shepard, Eisenberg, & Fabes, 2004), and this was, in fact, found to be true.

Nelson et al. (1999) found that negative emotionality in parent-rated temperament of five years old children was a predictor of third grade teacher-rated adjustment difficulties. Results of variable path analysis showed that negative emotionality predicted all four adjustment outcome measures: school performance problems (.27), internalizing problems (.16), positive social behaviors (-.13), and externalizing problems (.36) which had the strongest relationship with negative emotionality which accounted for 16.6% of the variance in teacher rated externalizing problems.

Similarly, although Reed-Victor (2004) reported that all of the four dimensions of temperament were significant predictors of adjustment in the total sample, negative emotionality ($\beta = -0.37, p < .0001$) was the strongest predictor of concurrent, teacher-rated school adjustment. The other three dimensions were as follows: inhibition ($\beta = 0.29, p < .0001$), task persistence ($\beta = 0.189, p < .05$), and activity ($\beta = 0.184, p < .05$). Teacher ratings of temperament accounted for 58% of the variance in the children's teacher-rated school adjustment.

Coplan et al. (2003) also found that negative affect was significantly correlated with social competence at ($r = -.24, p < .01$), inattention ($r = -.20, p < .05$), and shyness ($r = -.19, p < .05$). In addition, inattention was significantly and positively related to externalizing problems ($r = .24, p < .01$). Shyness correlated with internalizing and externalizing behaviors ($r = .28$, and $r = -.24, ps < .01$), respectively. Although this finding of shyness relationship is consistent with previous research (Coplan, 2000; Goldsmith, Aksan, Essex, Smider, & Vandell, 2001) about one dimension of shyness (inhibition), Chen et al. (2009) found contrasting results. Chen et al. investigated the relationship between inhibition at 2 years and adjustment outcome variables at 7 years old in Chinese children. Inhibition was positively associated with later cooperative behavior ($r = .24, p < .001$), peer liking ($r = .17, p < .05$), perceived social integration ($r = .23, p <$

.001), school attitudes ($r = .18, p < .01$), teacher-rated competence ($r = .19, p < .01$), and distinguished studentship ($r = .27, p < .001$). Inhibition was also negatively associated with later teacher-rated learning problems ($r = -.16, p < .05$), and it was not significantly associated with antagonistic behavior. This pattern of relationship between inhibition and later adjustment outcomes in Chinese children, which was different from that typically found in Western children, conveys the role of environmental context and the goodness of fit concept that was explained in the second section of this chapter.

Bouffard et al. (2005) found that parent ratings of four dimensions of temperament, activity level, distractibility, adaptability, rhythmicity, and emotional reactivity, were significantly correlated with later adjustment by both parents and teachers. Thirty three significant correlations were found, ranging from weak to moderate. Similar to previously discussed findings, low emotional reactivity was found to have a significant negative relationship with conduct problems in both parent and teacher reports ($r = -.37$ and $r = -.27, ps < .001$), respectively. This was also true for other variables: perfectionism ($r = -.22, p < .001$) and ($r = -.17, p < .01$) and self-regulation ($r = .25$ and $r = .20, p < .001$) for parent and teacher, respectively. Distractibility was found to have significant relationships with multiple variables of adjustment: perfectionism ($r = .21, p < .001$ and $r = .15, p < .01$), conduct problems ($r = .17$ and $r = .15, ps < .01$), self regulation ($r = -.44$ and $r = -.30, p < .001$), and openness ($r = -.25$ and $r = -.18, ps < .001$) for parents and teachers, respectively in each case. However, activity level was found to be more significant as a factor in teacher-rated adjustment than in parent-reported adjustment; whereas adaptability was more significant in parent-reported adjustment than in teacher-reported adjustment. These interrater influences and differences will be discussed later in this section.

Sanson et al. (2009) found significant differences between the four temperament clusters (nonreactive/outgoing, high attention regulation, poor attention regulation, and reactive/inhibited cluster) that they investigated and the later school adjustment outcomes, based on parent and teacher ratings of behavior problems (aggression, hyperactivity, and anxiety), and teacher-only ratings of social skills, reading ability, and academic competence. For children at seven and eight years old, significant differences existed between clusters on parent-reported behavior problems of aggression, hyperactivity, and anxiety. Teacher-reported variables showed significant differences between clusters on aggression, hyperactivity, academic competence, and reading ability, but not on anxiety or social skills. Children in cluster 3 (poor attention regulation) and cluster 4 (reactive/inhibited) generally had higher scores on all types of behavior problems than those in cluster 1 (nonreactive/outgoing) and cluster 2 (high attention regulation) in the parent report; whereas in the teacher report, clusters 1 and 3 generally had higher scores on aggression and hyperactivity and clusters 1 and 2 generally had higher scores on reading ability and academic competence.

At ages 11 and 12 years old, significant differences were found between clusters with respect to all parent-reported behavior problems (aggression, hyperactivity, depression, anxiety) and social skills. Children in cluster 3 (poor attention regulation) and cluster 4 (reactive/inhibited) generally had higher scores on all types of behavior problems than those in cluster 1 (nonreactive/outgoing) and cluster 2 (high attention regulation). Significant correlations were also found in the teacher report of behavior problems (aggression and hyperactivity), social skills, and academic competence. Contrary to the parent report, however, clusters 1 and 3 showed higher scores on the two variables of behavior problems (aggression and hyperactivity), clusters 2 and 4 had higher scores on social skills, and clusters 1 and 2 had higher

scores on academic competence. In the children's self-reports, the researchers found small but significant differences between the clusters for hyperactivity and total social skills. Those in cluster 3 had high scores on hyperactivity and clusters 1 and 4 had high scores on social skills. Effect sizes were small.

Blair et al. (2004) and Liew et al. (2004) examined two dimensions of temperament: negative emotionality and effortful control. Effortful control reflects individual or dispositional differences in the ability to control or regulate emotion and behavior associated with biological arousability (Rothbart & Bates, 2006). In order to minimize the number of final analyses, Liew et al. performed a data reduction on the measures of negative emotionality and effortful control to develop a single dimension that they labeled effortful control/ low negative emotionality. They reported their findings for parent, teacher, and peer reports. Liew et al. utilized partial correlations to control for age and gender between a temperament dimension of effortful control/ low negative emotionality and adjustment and social competence. Their findings indicated significant relationships between those variables from the parent report $r = .46$, teacher report $r = .72$, and peer report $r = .42$ (all $ps < .001$). Blair et al. found only one aspect of temperament that predicted any dimension of social behavior; effortful control was significantly related to social competence at ($r = .22$ $p < .05$). Although negative emotionality dimensions of irritable and sad/fearful were negatively and significantly correlated with effortful control ($r = -.35$ and $r = -.26$, $ps < .05$), they did not correlate with any of the adjustment outcome variables for social behaviors, that is, internalizing behaviors, externalizing behaviors, and social competence.

Prior et al. (2001) examined child temperament as an influence on adjustment by comparing two groups: children at-risk for behavioral disorders and a comparison group of typically developing children. This study obtained longitudinal data about children of different

ages. Significant differences were found in the temperament dimensions between the two groups across all assessed ages. One to three year olds showed significant differences in irritability and reactivity ($F=15.99, 18.78, ps < .001$), with three to four year olds showing differences in inflexibility and persistence ($F=15.11, 12.50, ps < .001$). At ages five to six and seven to eight parent reports showed differences in inflexibility and persistence ($F=19.80$ and $24.42, ps < .001$), ($F=45.02$ and $20.13, ps < .001$), as well as in emotionality ($F=27.06, p < .001$) for nine to ten year olds. The teachers' reports showed the strongest significant differences at ages five to six, with task orientation for ages five to six ($F=21.69, p < .001$) and seven to eight ($F= 23.44, p < .001$). In addition, the teachers' reports for seven and eight year old children found significant differences in task orientation, flexibility, and reactivity ($F= 23.44, 15.98, 14.83, all ps < .001$) as well. Prior et al. concluded, by calculating the odds ratios across the years, that specific temperament dimensions are significant predictors for the adjustment of 12 year old children.

Participant demographics. The reviewed studies investigated the influence of participant demographics on the examined variables of children's temperament and school adjustment. For example, three studies (Blair et al., 2004; Chen et al., 2009; Prior et al., 2001) found significant differences between boys and girls in school adjustment variables. Blair et al. (2004) found that boys and girls differed significantly in social behaviors and social competence. Girls were rated as significantly more socially competent, and were found to exhibit less social behavior problems, both internalizing and externalizing behaviors, than boys. Similarly, Chen et al. (2009) indicated that boys had lower scores than girls on cooperative behavior, peer liking, perceived social integration, school attitudes, and teacher-rated competence and higher scores on antagonistic behavior and teacher-rated learning problems. Prior et al. (2001) indicated that gender differences were differences in the strength, rather than the nature, of the effects.

Internalizing behaviors and social skills were reported by both parents and teachers to be stronger for girls than boys; whereas hyperactive and externalizing behaviors were differentiators for boys. These findings are expected and consistent with previous research in North America, China, and other areas (Eisenberg, Fabes, & Spinrad, 2006; Whiting & Edwards, 1988).

Significant differences in the effects of participant demographics on children's temperament were found in three studies (Liew et al., 2004; Nelson et al., 1999; Prior et al., 2001). Liew et al. (2004) found that age was significantly positively correlated with parental reports of effortful control. Also, gender was correlated in teacher-rated effortful control with girls higher than boys; whereas peers rated girls as higher than boys on social competence/adjustment. Nelson et al. (1999) found significant differences in the emotional intensity temperament variable with respect to gender. Boys were rated as more emotionally intense than girls. However, they reported no significant differences in ethnicity for white, non-Hispanic and Hispanic children with respect to temperament variables or behavior problem measures. Prior et al. (2001) found that hyperactive behavioral problems and temperament characteristics, such as inflexibility and persistence, were more powerful discriminators for boys. Other studies, such as Chen et al. (2009), reported no significant gender differences in the temperament variable of inhibition. Likewise, Sanson et al. (2009) found only one significant difference between the temperament clusters in terms of gender and socioeconomic (SES) factors, that is, that children in Clusters 3 and 4 who were living in low SES environments tended to display higher levels of aggression at seven to eight years of age, according to parent reports. However, this study also indicated that this one finding of the influence of SES could be due to chance alone. They concluded that SES and gender are not substantive moderators of the associations between temperament clusters and later adjustment.

Blair et al. (2004) did not use the demographic variables of ethnicity, family income, and parent education and Bouffard et al. (2005) did not use gender or school level as covariates in their later analyses after performing preliminary analyses which indicated no, or minimal effects of those demographics on the examined variables.

Interrater differences. Several studies used multiple informants to obtain data about the examined variables. Two studies (Liew et al., 2004; Prior et al., 2001) utilized parent and teacher reports of the children's temperaments. With respect to school adjustment, two studies (Bouffard et al., 2005; Sanson et al., 2009) obtained data from both parents and teachers and two studies (Liew et al., 2004; Prior et al., 2001) used three informants, that is, parents, teachers, and peers. Using multiple informants can provide more accurate and reliable data for the examined variables due to bias when one source of information is used and because of the nature of the investigated variable (Achenbach, McConaughy, & Howell 1987). Assessments of personality, such as temperament, as well as aspects of adjustment, such as internalizing behaviors, are error prone (Horton, Laird, & Zahner, 1999) because personality measures can be difficult to define what has been measured, therefore, the same label or construct can be measured differently. Additionally, other sources of error can be response set and faking. Response set refers to the tendency of the reporter to respond in the same way to all items regardless of content and faking can occur when the reporter tends to answer in a certain way for social desirability or positive consequences (McMillan, 2008).

Liew et al. (2004) reported that although measures of self-regulation of effortful control and negative emotionality tended to be related across informants, the agreement between informants tended to be low. These researchers pointed out the importance of considering differences in the environmental contexts; the home and school contexts are very different.

Teachers observe children in the classroom and in playground settings, which each have demands of behavior and social functions that are different from those in the home. Also, teachers' perspectives and values with respect to certain variables may be different from those of parents. For example, parents may be more prone to biases about social desirability than are teachers, when reporting on a child's popularity or social status; whereas temperament variables connected with task orientation can be essential, and thus more noticeable, for teachers than for parents.

On the other hand, Bouffard et al. (2005) compared the relationship between children's temperament and school adjustment, as evaluated by parents and teachers. They found that all pairs of relationships were in the same direction, that is, they were alike in being either positive or negative. However, the correlations that were based on parent reports were stronger than those from teachers for all the significant correlations, with only one exception (activity level with self-regulation had a correlation of $r = .14$, $p < .05$ for both parents and teachers). Also, significant correlations between parent-rated adjustment and teacher-rated adjustment were found in all dimensions of temperament (self-regulation $r = .55$, openness $r = .42$, withdrawal $r = .39$, conduct problems $r = .36$, insecurity $r = .25$, and perfectionism $r = .12$, all $ps < .05$).

Summary. The findings reported in the reviewed studies show that a significant relationship exists between temperament and school adjustment. Individual differences in temperament can be manifested in the behavioral style of the child in the classroom. Certain behavioral patterns that a child exhibits are influenced by his/her temperament traits as well as by the interaction between the child's temperament and the environment. Negative emotionality was found to be a dimension of temperament that fundamentally influences school adjustment. Children with negative emotionality are prone to intense emotions, such as intense crying or

anger in response to frustration, prolonged emotional upset as a result of changes in plans, and a general tendency toward irritability. Those negative emotion patterns were shown to be associated with both internalizing and externalizing problems. Effortful control was also found to significantly relate to social competence and externalizing behaviors. Children with a high level of effortful control have the ability to regulate their emotions to meet the expectations and demands of the classroom environment. This ability contributes to successful school adjustment.

Temperament and academic achievement

Search strategy. The search strategy used for temperament and academic achievement was similar to the one employed for temperament and school adjustment. That is, two types of searches were used to identify articles for this review. First, a computer search was conducted of seven electronic databases (Academic Search Complete, Education Research Complete, ERIC, PsycARTICLES, PsycINFO, Psychology and Behavioral Sciences Collection, and Teacher Reference Center) using the keywords *Temperament AND Achievement AND School, Temperament AND Achievement AND Classroom*. Second, an ancestral search on all identified articles was conducted to obtain additional studies not found through the original computer search.

Selection criteria. Similar selection criteria to those used to select studies for the first section of this literature review (temperament and school adjustment) were utilized with only one modification, which pertained to years of publication. Studies were selected based on the three following inclusion criteria that are relevant to the present study (a) the studies were English language, empirical, peer-reviewed, published articles; (b) the grade levels examined were pre-kindergarten through 12th grade; and (c) the studies were published between 1985 and 2009. An attempt has been made to review just the current studies from 1999-2009, in concert with the

first literature review, but searching from 1999 to 2009 yielded too few studies. Thus, the investigator chose to extend the search years back to 1985, because this year included one of the landmark studies (Martin & Holbrook, 1985) in temperament and academic achievement. Therefore, it is believed that subsequent research studies increased since then. In response to this seminal study, the number of articles in this area increased after its publication, allowing the investigator to obtain sufficient numbers of sources by including the years from 1985-1998 in the search

Search results. Of the 131 articles found, only 10 studies met the selection criteria, with one (Martin et al., 1988) including three qualifying studies, for a total of 12 studies included in the review. Tables C and D1 through D6 (see Appendices C and D) summarize the characteristics of the reviewed studies. Similar to the review in the first section (Temperament and School Adjustment), the research studies in this section were organized by the investigator into seven sections: participants, settings, independent variables, dependent variables, instrumentations, research designs, and results. As previously stated, this review was a methodology literature review, designed to serve three purposes (a) to evaluate the current condition of and trends in the relevant literature, (b) to provide explanations or justifications for any variance in the findings, if such exist, and (c) to identify gaps in the existing literature that may need further investigation, to determine future research directions.

Participants and settings. Table C (see Appendix C) reveals that many of the reviewed studies did not provide detailed demographic information about the participants, such as the participants' ages, grade levels, gender and/or ethnicity. Of the reviewed studies, only four studies reported detailed demographic information about their participants (Guerin, et al., 1994; Li, Onaga, Shen, & Chiou, 2009; Martin et al., 1988; Martin & Holbrook, 1985). The

demographics of these studies was similar to those that were previously discussed as being reported for temperament and adjustment. That is, the majority of the participants were Caucasians, with fewer than 10% of the participants in each study being children of other ethnic backgrounds (e.g., African Americans, Hispanics, Asians, other); the only exception was the first of the three studies (Martin et al., 1988) which examined 101 African American children and only 16 Caucasian children.

The majority of these studies examined temperament and academic achievement in early childhood (Bramlett, Scott, & Rowell, 2000; Deater-Deckard, Mullineaux, Petrill, & Thompson, 2009; Li et al., 2009; Martin, Drew, Gaddis, & Moseley, 1988; Martin & Holbrook, 1985; Newman, Noel, Chen, & Matsopoulos, 1998). Four studies focused on temperament and academic achievement in middle or late childhood/adolescence (Bruni et al., 2006; Guerin et al., 1994; Maziade, Côté, Boutin, Boudreault, & Thivierge, 1986; Mevarech, 1985).

Almost all the reviewed studies were conducted in public schools. In Study 2 of Martin et al. (1988), however, the setting was a university affiliated preschool clinic. Four studies were conducted in countries other than the United States: Italy, Canada, Taiwan, and Israel (Bruni et al., 2006; Maziade et al., 1986; Li et al., 2009; Mevarech, 1985), respectively.

Several studies reported findings by age and/or gender (Bruni et al., 2006; Deater-Deckard et al., 2009; Guerin et al., 1994; Maziade et al., 1986; Newman et al., 1998).

Discussions of the influence of the participants' demographics on the investigated variables will be provided in the results section below.

Dependent variables. Academic achievement was the dependent variable in all of the reviewed studies and was defined as the performance of students on various educational measures. The majority of the research examined two academic areas; reading and mathematics.

However, study 1 and study 2 of Martin et al. (1988) also examined spelling and writing. Maziade et al. (1986) also included writing in their investigation. One study examined only science achievement (Li et al., 2009). Four studies used only standardized measures of academic achievement (Bramlett et al., 2000; Bruni et al., 2006; Deater-Deckard et al., 2009; Li et al., 2009), and five studies utilized both standardized tests and teacher rated achievement or assigned grades (Guerin et al., 1994; Martin et al., 1988; Martin & Holbrook, 1985; Mevarech, 1985; Newman et al., 1998). One study relied solely on teacher assigned grades in mathematics, reading, and writing (Maziade et al., 1986). Two notable findings with respect to standardized measurements and teacher rated achievement as well as with respect to the subject matter of reading and math are that (a) the reviewed studies showed that teacher rated achievement has a more significant relationship with temperament traits than standardized achievement tests, and (b) math achievement tends to have a less significant relationship with temperament traits than does reading, so in some cases math achievement did not correlate at all with temperament traits. A further discussion of these findings will be provided in the results section below.

Independent variables. Children's temperament was the independent variable in the reviewed studies; however, as previously stated, temperament includes multiple temperament dimensions or characteristics, which are measured differently by various researchers. Tables D1 through D6 (see Appendix D) outline the temperament dimensions of each reviewed study. Eleven studies used measures that were based on the clinical model of Thomas & Chess (1977) and, therefore, the dimensions they investigated were very similar, specifically: activity level, distractibility, adaptability, approach/withdrawal, positive or negative mood, intensity, threshold, and/or inhibition (see the temperament models for descriptions of these dimensions). Only one study (Deater-Deckard et al., 2009) utilized the Child Behavior Questionnaire-Short Form

(CBQ-SF; Putnam & Rothbart, 2006), which is based on the developmental model of Rothbart and Derryberry (1981). This measure examines two dimensions of temperament: surgency and effortful control. Further discussion of the temperament dimensions of each study is provided in the measurements section below, based on the temperament measure that each researcher employed.

Measurement. Two variables were measured in the reviewed studies: the children's temperament and their academic achievement.

Children's temperament. Tables D1 through D6 (see Appendix D) outline each measure and the assessed dimensions of temperament used in each reviewed study. Unlike the literature on temperament and school adjustment, the reviewed studies on temperament and academic achievement only utilized four standardized questionnaires to assess the temperament dimensions. An examination of each of these instruments shows that the temperament measures that were employed in the reviewed studies were based on only two of the four models of temperament that were described earlier in this chapter. The majority of studies utilized measures based on the clinical model of Thomas and Chess (1977); and only one study (Deater-Deckard et al., 2009) used the Child Behavior Questionnaire-Short Form (CBQ-SF; Putnam & Rothbart, 2006), which is based on the developmental model of Rothbart and Derryberry (1981). This latter measure examined two dimensions of temperament: surgency and effortful control. As described in the temperament models section, effortful control indicates a self-regulatory capacity and includes attention focusing, inhibitory control, low intensity pleasure, and perceptual sensitivity. Surgency indicates high-energy activation and includes impulsivity, high intensity pleasure, activity level, and low levels of shyness. The other eleven studies used measures based on the clinical model of Thomas & Chess (1977) and thus investigated the

following temperament dimensions: task orientation (e.g., activity, distractibility, persistence), personal-social flexibility (e.g., adaptability, approach/withdrawal, and positive mood), and reactivity (e.g., intensity, threshold, negative mood) (see the temperament models for dimensions descriptions).

All the reviewed studies obtained their data from parents and/or teachers. Four studies utilized assessments reported by parents (Deater-Deckard et al., 2009; Guerin et al., 1994; Maziade et al., 1986; Newman et al., 1998). Seven studies included the teacher's assessment (Bruni et al., 2006; Li et al., 2009; Martin & Holbrook, 1985; Martin et al., 1988; Mevarech, 1985), and only one study (Bramlett et al., 2000) used both the parents' and teachers' ratings of the children's temperaments. A discussion of the differences/agreements in the teacher and parent reports of children's temperament will be provided below in the results section.

Academic achievement. Researchers assessed children's performance on the subject matter (e.g., reading, math, writing, and science) using two methods: standardized achievement tests and/or teacher rated achievement. Tables D1 through D6 (see Appendix D) outline each measure and the assessed subject matter of each reviewed study. The provided tables show that four studies used only standardized measures of academic achievement (Bramlett et al., 2000; Bruni et al., 2006; Deater-Deckard et al., 2009; Li et al., 2009). Five studies utilized both standardized tests and teacher rated achievement or assigned grades (Guerin et al., 1994; Martin et al., 1988; Martin & Holbrook, 1985; Mevarech, 1985; Newman et al., 1998), and one study included only teacher assigned grades (Maziade et al., 1986) to assess math, reading, and writing. Different methods of measurement, as well as the variables that were measured such as reading, math, or science, were found to influence the findings of the studies. As indicated above, teacher rated achievement or assigned grades have a more significant relationship with

temperament traits than do standardized achievement tests, and reading, in general, tends to have a more significant relationship with temperament traits than do the other areas of study. This will be further discussed in the results section below.

Research designs. The reviewed studies proposed to examine the predictive relationship between children's temperament and their academic achievement. Therefore, the research designs in all of the reviewed studies were quantitative, non-experimental, correlational designs that used two main statistical analyses: correlations, which examined the associations between temperament variables and academic achievement, and/or multiple regression analyses, which examined temperament variables as predictors and academic achievement as outcomes. Li et al. (2009), however, conducted a repeated measure longitudinal study, which examined the dependent variables for four years after the initial study. Nine of the remaining studies obtained longitudinal data, as well, by investigating temperament and then later academic achievement; only two studies (Bruni et al., 2006; Mevarech, 1985) researched the concurrent relationship between temperament and academic achievement.

Results. The findings of the reviewed studies varied, as described in detail below. The variation in the findings can be accounted for by four factors. (a) Temperament includes a number of temperament traits; certain traits tend to be more significantly correlated with academic achievement than other traits are. (b) Data was obtained using different informants (parents and/or teachers); certain temperament traits appeared to be salient in the ratings of one or the other type of informant. (c) Demographic information about participants such as gender, age, and ethnicity had an influence on the findings. And (d) academic achievement was measured using standardized assessment tests and/or teacher rated achievement; the nature of

these assessments is different and therefore affects the results. Results are discussed below in light of those four factors.

Significance of temperament traits. Several temperament traits were investigated in all the reviewed studies. As described above, the temperament traits that were examined depended on the specific model of temperament; these were introduced at the outset of this chapter. Except for one study (Deater-Deckard et al., 2009), all the reviewed studies examined temperament traits that had been developed based on Thomas and Chess (1977) model of temperament. Therefore, the ten studies measured almost exactly the same dimensions of temperament with few variations. In presenting these findings, the investigator used Keogh et al. (1982) approach in which she categorized the dimensions of temperament into three categories: task orientation, personal-social flexibility, and reactivity.

Keogh et al. (1982) and Keogh (1986, 1989, 2003) identified these three categories as the most significant for academic success for the following reasons. Task orientation includes dimensions of activity level, distractibility, and persistence. A child with a high level of task orientation is focused, involved in learning, able to stay on-task, and modulates his/her activity level in a desirable and productive way. Personal-social flexibility includes adaptability, approach/withdrawal, and positive mood because a child with a high level of personal-social flexibility has the ability to adapt to the environment, is friendly and easygoing, and can establish positive relationships with peers and adults. Reactivity is comprised of three dimensions of temperament: intensity, threshold, and negative mood. A child with a high level of reactivity tends to exhibit intense behaviors and be easily irritated and over-reactive in different situations.

Task orientation. This set of temperament traits includes persistence, activity, and distractibility. In the reviewed studies, task orientation accounted for 62.9% of the significant

correlations across the reviewed studies. Within this group of temperament traits, persistence accounted for 46.4% of the significant correlations in the range from moderate to weak positive correlations. Distractibility is the second most influential temperament trait and accounted for 28.6% of the significant correlations in the range from moderate to weak negative correlations with one strong correlation ($r = -.62, p < .01$) of teacher assigned grades for reading achievement (Martin et al., 1988). Activity accounted for 25% of the significant correlations in the range from moderate to weak negative correlations.

Bramelett et al. (2000) found that teachers' ratings of persistence ($\beta = .379, p < .001$) and parents' ratings of persistence ($\beta = .174, p < .04$) were significant predictors of reading achievement. Persistence accounted for 24.0% of the variance in standardized reading scores and accounted for 9.3% of the variance in standardized math scores. Bruni et al. (2006) found that task orientation strongly correlated with school achievement index (SAI); they reported that task-orientation and social flexibility accounted for about 51% of the total variance, making them the most predictive factors for SAI.

Personal-social flexibility. This set of temperament traits includes adaptability, approach/withdrawal, and positive mood. It accounted for 22.5% of the significant correlations across all studies. Within this group, adaptability accounted for 55% of the significant correlations in the range from moderate to weak positive correlations. Approach/ withdrawal accounted for 35% of the significant correlations in the range from moderate to weak positive correlations, and positive mood accounted for 10% of the significant correlations in the range from moderate to weak negative correlations. Bruni et al. (2006) found that personal–social flexibility moderately correlated with the school achievement index (SAI) ($r = .40, p < .001$). As

indicated in the above discussion, the temperament traits of task orientation and personal–social flexibility were found to be the most predictive factors for academic achievement.

Reactivity. This set of temperament traits includes intensity, threshold, and negative mood and accounted for 14.6% of the significant correlations across all studies. Intensity accounted for 84.6% of the significant correlations, all of which were weak negative correlations. Negative mood (emotionality) and threshold both had the same percentages at 7.7% for each; again, all were weak negative correlations. Bruni et al. (2006) found that reactivity had a weak negative correlation with the SAI ($r = .21, p < .001$) but it did not appear to account for as much of the variance in SAI as the previous two temperament trait groups did. This group of temperament traits had the least influence on academic achievement, as only three studies reported significant correlations of intensity with academic achievement (Guerin et al., 1994; Martin et al., 1988; Martin & Holbrook, 1985). One reported a correlation for negative emotionality (Newman et al., 1998), and one reported a correlation for threshold (Guerin et al., 1994).

Other temperament traits. As previously noted, only one (Deater-Deckard et al., 2009) of the reviewed studies employed the developmental model of temperament and, accordingly, utilized two different dimensions from those described above. These two dimensions are: surgency and effortful control. This category includes these two temperament traits as well as any other temperament traits that were different from the above but were included and reported less frequently than the three groups mentioned above. For instance, Guerin et al. (1994) found significant relationships, ranging from $r = .20$ to $r = .24, ps < .05$ between predictability and reading achievement for children from 10 to 12 years old. Maziade et al. (1986) reported a moderately positive relationship between positive mood and math achievement in seven year old

children ($r = .50, p < .005$) and 12 years olds ($r = .37, p < .05$). Deater-Deckard et al. (2009) found one weak positive correlation ($r = .20, p < .05$) between effortful control and reading scores.

Participants' demographics. Only three studies (Deater-Deckard, 2009; Guerin et al., 1994; Newman et al., 1998) reported any influence of the participants' demographic data on the examined variables. Age was the most commonly reported moderating variable; however the reported effect of age on the examined variables was somewhat inconsistent. While some cases showed that younger children tend to have a more highly significant relationship between temperament and achievement, others showed the opposite. For example, Guerin et al. (1994) examined children from 10 to 13 years old and found that higher correlations between persistence and standardized reading achievement were found for younger children, but lower correlations were found for younger children compared with those of older children in both reading and math of the teacher rated achievement. In contrast, Mevarech (1985) found that correlations between the teacher's rating of achievement and task oriented behavioral style (adaptability, persistence, distractibility, and threshold) were higher for second graders than fourth graders ($r = .74$ and $r = .54, ps < .05$), respectively.

Newman et al. (1998) examined gender as a moderating variable, but their findings did not support their hypothesis that gender was a moderating variable between any temperament dimension and reading achievement in the first grade. Deater-Deckard (2009) examined the influence of children's age and gender on the investigated variables. Only two notable findings were reported for gender differences, that is, girls were higher than boys in effortful control, ($r = -.29, p < .001$), and lower than boys in surgency ($r = .18, p < .01$).

Standardized achievement tests versus teacher ratings. Reading and math were the most frequently examined subjects for academic achievement using standardized assessment measures or teacher rated achievement. In general, the results indicated that math achievement, as measured by both standardized and/or teacher ratings, tended to have a less significant relationship with temperament traits, and in some cases math did not correlate with temperament traits even when reading did so significantly (Bramlett et al., 2000; Guerin et al., 1994; Martin et al., 1988; Martin & Holbrook, 1985). Both standardized achievement tests and teacher rated achievement were found to show significant relationships with children's temperament. Nevertheless, teacher rated achievement had a more significant relationship with temperament traits than did standardized achievement tests. For instance, in Mevarech (1985) the teacher rated achievement and task orientation correlations ranged from $r = .54$ to $r = .74$, $ps < .05$; whereas the standardized achievement tests correlations ranged from $r = .33$ to $r = .61$, $p < .05$. Similarly, Martin and Holbrook (1985) reported higher correlations between teacher rated achievement and task orientation, which ranged from $r = -.40$ to $r = .56$, $ps < .01$ than between standardized achievement tests and task orientation, which ranged from $r = -.33$ to $r = -.44$, $ps < .01$. Similar findings of more highly significant relationships with standardized tests than with teacher rated achievement were reported by other studies as well (Bramlett et al., 2000; Guerin et al., 1994; Martin et al., 1988). This difference in the strength of the relationships may be explained by looking at the nature of each test. Standardized tests tend to be objective measure of achievement; whereas teacher rated achievement tends to be a subjective measure. However, this explanation does not imply that one test is more accurate than the other, as each test has its own advantages and disadvantages. For example, although standardized achievement tests can provide an objective evaluation of a child's performance, they measure achievement at one point

in time, which may underestimate the child's usual performance (Guerin et al., 1994; Keogh, 2003).

Parent ratings versus teacher ratings. The strengths of the significant relationship between temperament and achievement differed between the two groups of raters. Although both teacher and parent reports of a child's temperament correlated significantly with academic achievement, the parent's ratings of temperament were not as strongly correlated as the teacher's ratings. Thus, teacher ratings of temperament were found to be better predictors of achievement as measured by either assigned grades or standardized tests than parent ratings (Bramlett et al., 2000; Neman et al., 1998; Martin & Holbrook, 1985; Martin et al., 1988). The various researchers offered explanations about this difference in strength of the relationship. For instance, Newman et al. (1998) referred to a halo effect, which may increase the size of the correlations of teacher ratings because their ratings may be influenced by the teacher's observations of the child's performance. This may particularly be true when the same teacher provides data on temperament as well as providing teacher assigned grades. Another explanation for the difference between the strengths of the parent and teacher ratings of temperament is the influence of context; different temperament characteristics are salient in the home; whereas others are salient in the school setting (Bramlett et al. 2000; Keogh, 1982; Liew et al., 2004; Prior, 1992). For example, task persistence, adaptability, and social inhibition can be more apparent in the classroom than at home. In the classroom, the child interacts with peers and teachers and is expected to work on a task and complete it. On the other hand, task orientation temperament traits may not be as disturbing or as noticeable in the home as they are in the classroom in which a structured activity and specific rules are in place. Additionally, when reporting on a child's activity level, negative emotionality, and distractibility, parents may be

more prone to be biased about their child's social desirability than teachers would be. However, while there are differences in the strength of the relationship between parents' and teachers' ratings of children's temperament, both parents' and teachers' ratings of children's temperament were significantly correlated with academic achievement.

Summary. The findings reported in the reviewed studies that have been discussed above provide significant support for the concept that identifying temperament at an early age can predict concurrent and later academic achievement. Some inconsistencies were found in the results, which may result from the studies having used: (a) different reporters of the children's temperament (parents versus teachers); (b) different measures, that is, teacher rated achievement versus standardized tests; and (c) different subject areas such as, reading versus math.

Nevertheless, all studies reported significant correlations between the children's temperament and their academic achievement. Of all the temperament traits, task orientation, which is characterized by high task persistence, low activity level and low distractibility, was found to have the most highly significant relationship with academic achievement as well as being a predictor of academic achievement. Children whose behavioral tendencies were geared toward working on and completing tasks with minimum distractibility and a low activity level can perform at a high level academically. The temperament trait of personal-social flexibility, which is characterized by high adaptability, approachability, and positive mood, was also found to have a highly significant correlation with academic achievement, although less than that of task orientation. Children whose behavioral tendencies were to be adaptable, easy to work with, and friendly were able to meet the demands of the classroom for appropriate social behaviors to work with peers and adults in the classroom.

Conclusions

The purpose of the literature review was to examine the role of children's temperament in school adjustment and academic achievement. Evidence from the reviewed studies supports the concept that children's temperament plays a role in academic and social behavior outcomes. Certain temperament traits were found to be significantly associated with both immediate and later school adjustment as well as with academic achievement. For instance, negative emotionality and effortful control were found to have significant associations with school adjustment, and task orientation and personal-social flexibility were found to have significant associations with academic achievement. Moreover, those specific temperament traits were found to explain variations in academic achievement as well as in school adjustment to a great degree. Identifying a temperament profile for children at an early age can aid in promoting the concept of goodness of fit, which has previously been discussed as referring to a match or fit between individual differences in temperament and the demands and features of the classroom environment. Such a profile can also provide an explanation of why a child misbehaves and/or underachieves. Therefore, this present study is built on the existing literature that examined children's temperament traits in a classroom context by identifying the children's temperament characteristics, and their relationship to immediate and later school adjustment as well as academic achievement in children at-risk.

CHAPTER III

Methodology

The purpose of this study was to investigate the concurrent and longitudinal relationships between children's temperament, school adjustment and academic achievement. This chapter describes the design, methods, and procedures that this study employed to address the research questions. The chapter is presented in seven sections: research design, participants, setting, procedures, instruments, and data analyses. This chapter concludes by addressing the limitations of the study.

Research Design

This present study employed a non-experimental correlational design to examine the concurrent and longitudinal relationships between four dimensions of temperament (inhibition, persistence, negative emotionality, and activity level), and two educational outcomes which are school adjustment and academic achievement.

Participants

This study was a follow-up to an initial study by Reed-Victor (2004). The participants in this study were 77 children at-risk who were eligible for Title I, special education, homeless education, and/or both special education and poverty-related programs (free lunch, Title 1, or homeless education). The sample consisted of 42 (54.5%) boys and 35 (45.5%) girls; their ages ranged from five to eleven years. The risk groups consisted of 49 (64%) who were economically disadvantaged, ten (13%) who had developmental delays, and 18 (23%) who had both economic

disadvantage and developmental delay. The majority of the children were African Americans 57 (74%); 13 (16.9%) were Caucasians; five (6.5%) were Hispanic; and 2 (2.6%) were other.

School Settings

The school settings for this study were early childhood and elementary schools in two neighboring school districts, within communities that were ranked in the top 10% of fiscally stressed areas in the Commonwealth of Virginia (USA). In the first phase of the longitudinal study, the sample was selected from 51 classrooms. These included public school programs that serve Title I preschool classes ($n = 14$) and two early childhood special education (ECSE) classes, which were located in four regional centers. The remaining ECSE classes and all the primary school classes were in ten public elementary schools, of which four were located in the highest poverty areas of the studied communities. At the preschool level, 12 classes only served children eligible for Title I, eight classes only served children eligible for special education, and three served both Title I and special education children. The primary-level classes included five self-contained special education classrooms and 23 predominantly general education classrooms with Title I and special education support services. In the follow-up sample, students were enrolled in 72 classrooms in 30 elementary schools across the two school districts.

Instrumentation

Several measures were used to collect data for the independent and dependent variables. the children's information was obtained using a child information form which was used to obtain information about children's demographics as well as eligibility for services. Three teacher rating scales were employed to gather data on children's temperament, school adjustment, and academic achievement. Two of the instruments were standardized measures: The Temperament Assessment Battery for Children- Revised (TABC-R; Martin & Bridger, 1999), and the Adaptive

Skills Scale of the Behavior Assessment System for Children-Teacher Rating Scales (BASC-TRS) (Reynolds & Kamphaus, 1992). Data on academic achievement were obtained using teacher ratings of the children's academic performance. Descriptions of the instruments used in this study to obtain data on the dependent and independent variables are provided below.

The Temperament Assessment Battery for Children- Revised (TABC-R; Martin & Bridger, 1999). The TABC-R was designed to assess four temperament traits of children two to seven years of age. It has both parent and teacher forms. The current study used the teacher form of the TABC-R, which includes 29 items describing behaviors reflective of activity level, inhibition, negative emotionality, and task persistence. The inhibition scale assesses the child's tendency to physically withdraw or to become emotionally upset when in an unfamiliar social situation. The negative emotionality scale measures individual differences in the tendency for children to become emotionally upset. For example, it shows whether the child cries, screams, or subtly expresses upset emotions such as by an angry look or a frowning face (Martin & Bridger, 1999). The activity level scale assesses the child's energetic gross motor activity, such as active/quiet play and difficulty/ease of controlling gross motor activity to complete a task. The task persistence scale measures attention and the ability to continue a task that is difficult. A high score on each scale is indicative of a high tendency toward negative behavior. Specifically, a high score on the inhibition scale indicates a high tendency to withdraw and feel stressed, a high score on negative emotionality is indicative of intense emotional expression, and a high score on the task persistence scale indicates a short attention span and a low ability to continue a difficult task (Martin & Bridger, 1999).

Likert-type ratings are based on the frequency of behaviors for individual children (1 = 'hardly ever' through 7 = 'almost always'). Items represent bipolar aspects of temperament

dimensions (e.g., high and low activity levels). Temperament dimension raw scores were calculated for students based on the factor analyses and scoring procedures outlined in the most recent TABC-R manual (Martin & Bridger, 1999).

Psychometric characteristics. The reliability and validity of the teacher form of the TABC (Martin & Bridger, 1999) were reported in their study as follows. Internal consistency was estimated using alpha coefficients. Inhibition had alpha coefficients of .87 and .83, activity levels of .86 and .79, negative emotionality of .90 and .89, and persistence of .93 and .90 for the normative and comparison samples, respectively. Test-retest reliabilities were assessed for short-term stability. Teachers' ratings were separated by four to eight weeks. The stability coefficients were in the .63 to .71 range, with the activity level being .47. The validity of the measure was assessed in terms of correlations between the scales, with the correlations ranging from .56 to .79. Convergent and discriminant validity were also reported using correlation coefficients. Correlations between temperament scales and measures of cognitive ability were found to be in the .26 to -.51 range, and the majority of the correlations between temperament scales and measures of personality were found to be in the .64 to -.89 range.

The Adaptive Skills Scale of the Behavior Assessment System for Children- Teacher Rating Scales (BASC-TRS) (Reynolds & Kamphaus, 1992). The BASC-TRS is a multidimensional measure that assesses aspects of personality, behavioral function, externalizing, internalizing problems and adaptive skills. For the purpose of this study, only the adaptive scale was employed to measure school adjustment in time two. The adaptive scale measures positive behaviors of children from preschool to adolescence, using three different forms for three age levels: preschool ages from four to five, child ages from six to eleven, and

adolescent ages from twelve to eighteen. For the purpose of this study the version that measures children with ages from six to eleven years was used.

High scores on the following scales indicate positive desirable behavior. The adaptive scale includes four scales (a) the adaptability scale assesses the ability to adjust to changes in routine, tasks, people, and situations, (b) the social skills scale assesses individual prosocial behaviors such as helping and/or complementing others, and admitting mistakes, (c) the leadership scale measures behaviors that may be associated with leadership potential, such as participating in extracurricular activities, and (d) the study skills scale relates to learning and academic behavior skills, such as completing homework (Reynolds & Kamphaus, 1992).

In the BASC-TRS, teachers are asked to rate the children on a four point scale ranging from “Never” to “Almost Always.” The BASC-TRS provides three different norm samples for scoring: general norms, female and male norms, and clinical norms. For this study, the general norms scoring was employed because these were normalized using large populations of United States children across wide categories of gender, race/ethnicity, and clinical or special education needs (Reynolds & Kamphaus, 1992).

Psychometric characteristics. Information on the reliability and validity of the teacher rating scales of this instrument was reported in the BASC-TR manual (Reynolds & Kamphaus, 1992). When the four adaptive scales were normalized for eight through eleven years old children, the internal consistency coefficient alpha ranged from .83 to .93 and the composite adaptive scale was .97. The test-retest reliability was also high. The reported alpha for the four adaptive scales ranged from .81 to .90 with only one coefficient alpha reliability of .76; the composite adaptive scale was .94. A seven month stability of scales was reported as follows: adaptability was in the .69 range, leadership was in the .85 range, social skills were in the .83

range, and study skills were in the .90 range. Evidence about the validity was strongly supported using three methods of assessing validity (a) empirical support from factor analysis for grouping of scales into composites; (b) the pattern of correlations of TRS scales and composites with scores obtained on other behavior measures; and (c) the TRS score profiles of groups of children with particular clinical diagnoses (for details, see the BASC manual; Reynolds & Kamphaus, 1992).

Academic achievement measure. Data on children's academic achievement were gathered by asking the teacher to rate the children on a four point scale: failing, below average, average, or above average in the following core subjects: reading or language arts, math, science, and social studies. Scoring for this question ranged from failing = 1, to above average = 4. Subsequently, a total academic achievement score was calculated by summing a child's score in all the subjects. This total academic achievement score was used in the statistical analyses and throughout this study to indicate academic achievement.

Procedures

The data for this study was collected by contacting two school districts to identify the current schools and teachers of the initial sample. With approval of school administrators, current teachers were asked to participate in this follow-up study. Of those contacted, 72 teachers agreed to participate by completing the TABC rating scale, the Adaptive Skills Scale, and the academic achievement rating for a total of 77 children in their public school classrooms. The classroom teachers completed the ratings during a two-week to three-week period of time. The data collection procedures were conducted in the second semester of the school year in order to allow sufficient time for the teachers to get to know the children and have interactions with them

in order to provide credible information about children's temperament, and their academic and social behaviors.

Data Analysis

There were three data analysis procedures. First, an exploratory data analysis was performed to screen and clean the data. Second, descriptive statistics for the demographic variables and the independent and dependent variables were obtained. Third, bivariate correlations and multiple regressions were conducted to address the research questions of the current study. All statistical analyses were performed using the PASW statistical package.

Exploratory data analysis (EDA) was performed to screen the data for any violations that could influence the results of this study. EDA was employed to (a) find any problems with the data such as outliers, non-normal distribution, and/or missing values, and (b) examine whether the assumptions of the proposed statistics, such as of linearity and normal distribution, are met and can be used (Leech, Barrett, & Morgan, 2008).

Descriptive statistics. Following the EDA procedure, descriptive statistics were obtained for both the sample demographics and the examined independent and dependent variables. The descriptive statistics included means and standard deviations for the demographics and the examined independent and dependent variables, which include the four scales of the temperament measurement, the composite adaptive skills scale, and the teacher rated achievement, as well as means and standard deviations when comparing scores by gender and eligibility for special education. In addition, correlations within the temperament dimensions were performed to understand how the temperament dimensions relate to each other.

Finally, *t*-tests were computed in order to compare the initial sample with the follow-up sample as to the demographic and study variables. The purpose of the *t*-test procedure was to

determine if the loss of participants that occurred in this follow-up study was selective or random. Significant differences in mean levels between the lost participants and the retained participants could possibly influence the results.

Bivariate correlations and multiple regressions were performed to address the three research questions. The investigator conducted several bivariate correlation coefficients and multiple regressions, preceded by the appropriate scatterplots. The scatterplots allowed for a visual depiction of the relationships between the examined variables, and a visual examination of the assumption of linearity and collinearity in the relationships between the variables. The first research question was concerned with the concurrent relationships between four dimensions of temperament, school adjustment, and academic achievement. Several correlation coefficients were performed to determine the associations between the four dimensions of temperament and the two dependent variables (school adjustment and academic achievement).

The second research question was concerned with the extent to which the four dimensions of temperament can predict both school adjustment and academic achievement. To address this question, two separate multiple regression analyses were performed. One was conducted for the four dimensions of temperament and the adaptive skills scale of the BASC-TRS which measures school adjustment. The second regression analysis was performed for the four dimensions of temperament and the one global score of teacher report of academic achievement.

The third research question was concerned with the longitudinal influence of the four dimensions of temperament and the outcome variables. For this question, the four dimensions of temperament that were obtained in Time 1 were regressed against the outcome variables in Time 2 in order to examine the extent to which the four dimensions of temperament can predict both

school adjustment and academic achievement after a two year interval. Similar to the procedure for the second research question, two separate multiple regression analyses were performed. One was conducted for the four dimensions of temperament in Time 1 and the adaptive skills scale of the BASC-TRS which measures school adjustment in Time 2. The second regression analysis was performed for the four dimensions of temperament in Time 1 and the one global score of teacher report of academic achievement in Time 2.

Limitations

This study has certain limitations that are associated with the design of the research. The design of this study is a non-experimental, correlational design which addresses the research questions and provides supporting evidence about the relationships between temperament, school adjustment, and academic achievement. The results of this study are useful in identifying the role of temperament in school adjustment and academic achievement for children at-risk; however, the findings will need to be interpreted with caution as they cannot be used to draw causal inferences. Another limitation of this study concerns limitations in the generalizability of the findings. The sample participants in this study were children at-risk for school and behavior problems. These children were identified based on specific criteria, which included disability and/or poverty. The participating children were eligible for special education, Title 1, or homeless education programs. In addition, the demographic information indicates that the majority of the participant children were African Americans, living in urban areas of the United States. Therefore, any attempt to generalize the findings should consider the sample and the settings of the current study.

CHAPTER IV

Results

The findings of this study are presented in three sections. The first section presents exploratory data analysis (EDA), which includes screening the data for missing values, outliers, and normality. The second summarizes the descriptive statistics for the demographics and the examined variables. The third describes the bivariate correlations and multiple regression analyses that were used to address the research questions.

Exploratory Data Analysis (EDA)

The data were examined for accuracy of data and the congruence of the variables with the assumptions relative to the proposed statistics. Several statistical and graphical procedures were performed in order to screen the data for missing values, outliers, normality of the distributions, and linearity of the relationships between the variables.

Missing values. The independent and dependent variables were examined for missing values. Five cases in the academic achievement variable had missing values. In those five cases, students did not have scores on reading/language arts, math, science, social studies, and total achievement. The number of the missing cases in the achievement variable was 6.5% of the total reported cases. The concern with the missing values was not so much that the sample size was reduced as it was that the remaining dataset could be biased. For this reason, a dummy variable with two groups, cases with missing values (value = 1) and cases with non-missing values (value = 0), were added to the dataset. Then, a test of mean differences was performed on the four

temperament variables (inhibition, persistence, negative emotionality, and activity level) in order to ascertain whether the missing data had any tendencies of selectivity. The test results (Table 2) showed no significant differences in the means between the groups with missing and those without missing variables in inhibition, negative emotionality, and activity level of the temperament variables. Only one variable (persistence) had significant differences in the means between the two groups. No substitution strategies were used to deal with the missing values.

Table 2

Comparison of Means on the Temperament Scale between Groups with and without Missing Values in the Academic Achievement Scale

| Temperament Variables | Missing Values Group | Non-missing Value Group | <i>t</i> -values |
|-----------------------|----------------------|-------------------------|------------------|
| Inhibition | 41.40 | 36.26 | -1.12 |
| Persistence | 25.60 | 30.15 | 2.43* |
| Negative emotionality | 33.40 | 30.87 | -.50 |
| Activity level | 18.40 | 16.89 | -.74 |

N = 77 (Non-missing Value Group = 72; Missing Values Group = 5)

* $p < .05$.

Test of normality. Bivariate correlations and multiple regression analyses were used in this present study in order to address the research questions. Both types of statistical analyses are parametric tests which are based on the normal distribution. Bivariate correlations, however, can be used with both the normal and non-normal distribution. Multiple regressions, on the other hand, require the distribution to be normal. Therefore, the investigator used statistical and graphical procedures to ensure that the assumption of the normality was met for each variable

including: frequency histograms with normal curve overlays, normal-probability plots (P-P plots), comparison of means and medians, and Kolmogorov-Smirnov tests.

As shown in Table 3, the Kolmogorov-Smirnov (K-S) tests revealed that of the four independent variables, one variable (persistence) was non-normal; the K-S test was significant at $.12, p < .05$. The two dependent variables were also found to be significant and therefore non-normal at $.15, p < .01$ and $.11, p < .05$, respectively. The other measures of normality that were performed, that is, the frequency histograms with normal curve overlays, the normal probability plots (P-P plots), and comparisons of the mean and median, confirmed the non-normality of persistence and the composite adaptive skills, but not the non-normality of academic achievement. A visual inspection of the histogram and the P-P plots, as well as the comparison of the means and medians indicated that the composite adaptive skills and persistence were negatively skewed. Academic achievement, however, appeared to approximate normality. Also, the mean for academic achievement was 10.10 and the median was 11.00 which are very close, thus indicating an approximation of normality. The persistence and the composite adaptive skills variables were each transformed using a natural log transform and were named as log transformed persistence and log transformed adaptive skills, respectively. Attempts that were made to transform the academic achievement variable were followed by retesting for normality using the K-S test; however, the K-S test continued to be significant at $.18, p < .001$. For this reason, as well as the findings of the other previously explained tests of normality which indicated that the academic achievement variable approximated normality, academic achievement data were not transformed.

Table 3

Tests of Normality on the TABC Scale, Composite Adaptive Skills Scale, and Academic Achievement

| | Kolmogorov-Smirnov |
|---------------------------|--------------------|
| Inhibition | .09 |
| Persistence | .12** |
| Negative emotionality | .09 |
| Activity Level | .08 |
| Composite Adaptive Skills | .11* |
| Academic Achievement | .15** |

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

A test of normality was also performed for the four dimensions of temperament in Time 1 (Table 4). Of these, negative emotionality was found to be non-normal, negatively skewed. Other measures of normality were performed, that is, frequency histograms with normal curve overlays, probability-probability plots (P-P plots), and comparisons of means and medians. The non-normal distribution of negative emotionality was confirmed using those other methods of checking for normality. In addition, activity level had a similar issue to that found for the academic achievement variable. Whereas the K-S test was significant at .11, $p < .02$, the visual inspection of the histogram and the P-P plots, as well as the comparison of the mean and the median indicated that the activity level variable approximated normality. The mean for activity level was 14.90 and the median was 14.67 which are close values, thus indicating that the activity level variable approximated normality. Negative emotionality was transformed using a natural log method, and the transformed variable was termed log transformed negative

emotionality. The activity level was not transformed since most of the measures indicated that it approximated normality.

Table 4

Tests of Normality on the Temperament Dimensions in Time 1

| | Kolmogorov-Smirnov |
|----------------------------|--------------------|
| TABC inhibition | .06 |
| TABC persistence | .07 |
| TABC negative emotionality | .17** |
| TABC activity | .11* |

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

Outliers. Frequency histograms with normal curve overlays and boxplots were obtained for all the examined variables to check for outliers. The following outliers were found in the dataset: Four instances (13, 35, 37, and 38) of outliers were found in the composite adaptive scale and one instance (35) was found in the inhibition scale. Additionally, for the temperament dimensions in Time 1, three cases (23, 26, 64) of outliers were found in the negative emotionality scale. Each outlier was inspected to determine if it was caused by an error or if it was, in fact, an accurate score corresponding to the variable. The inspection was carried out by checking each outlier to see if it was a correct data entry for the problem cases, which was determined by whether the data fell within the minimum and maximum range of the variables. The cases that contained outliers were found to have high scores on adaptive skills, a high score on inhibition and high scores in negative emotionality, but these were all within the maximum range. When the non-normal distributions were transformed, the outliers were corrected in both the adaptive skills and the negative emotionality scale of Time 1. The transformed data showed

no outliers for those two variables (log transformed adaptive skills, and log transformed negative emotionality). Thus, the only outlier that remained after transforming the data was a single case on the inhibition scale during Time 2. However, the outlier in the inhibition scale fell within acceptable limits, so it did not affect the normality of the distribution. Therefore, no outliers were removed from the analyses.

Linearity and collinearity. A scatterplot matrix was obtained for the examined variables in order to visually assess the assumption of linearity in the relationships. The research questions for this present study involve bivariate correlation and multiple regression tests. Both the correlation and multiple regression tests require that the relationships between each of the predictor variables and the dependent variable be linear. The scatterplot matrix of the independent and dependent variables indicated that the assumption of linearity in the relationships was met for all the variables. In addition, scatterplots can aid in testing for multicollinearity as well. Multicollinearity occurs when two or more predictors are highly correlated which indicate that the variables contain much of the same information. This can be problematic as the predictors must measure different constructs in order to be valid (Leech et al., 2008). Field (2009) pointed out that a correlation of $r > .90$ should be considered a substantial correlation. In this present study, the correlations between the predictors (see Table 15) ranged from $r = .41$ to $r = .72$, $ps < .01$. Accordingly, no multicollinearity exists in the data. An additional test of multicollinearity was also used, in which both the tolerance and variance inflation factor (VIF) were examined. A tolerance value less than 0.1 and/or a VIF value greater than 10 indicate a serious collinearity problem (Menard, 1995; Myers, 1990). For the predictor variables in this study, the tolerance value ranged from 0.27 to 0.62 and the VIF value ranged

from 1.61 to 3.70. Therefore, again the conclusion was that multicollinearity did not exist between the variables.

Descriptive Statistics

The purpose of this section is to understand the characteristics of the sample in this study as well as of the independent and dependent variables. The descriptive statistics are reported in two sections, the first of which provides a description of the sample including frequency, percentages, means and standard deviations and a comparison between the initial sample in Time 1 and the follow-up (Time 2) study sample. The second section presents a description of the independent and dependent variables, consisting of means and standard deviations of the examined variables and correlations within the examined variables.

Description of the sample. The sample for this Time 2 study was 77 children who were followed from the initial sample of 176 children. The sample consists of 42 (54.5%) boys and 35 (45.5%) girls, mean age 94 months ($SD=17.5$). Three risk groups were developed; 49 (64%) children were identified as belonging to the economic disadvantage group, ten (13%) were in the developmental delay category, and 18 (23%) were determined to have both economic disadvantage and developmental delay status. Fifty seven (74%) of the children were African Americans, 13 (16.9%) were Caucasians, five (6.5%) were Hispanics, and two (2.6%) were of other ethnicity. A comparison between the demographics of the current study and the initial study was conducted in order to determine if the attrition was selective, a situation that could influence the results. However, Table 5 shows that the numbers and percentages of the characteristics of the Time 2 sample and those of the initial Time 1 sample samples are very close in their values. These findings indicate that the attrition between the two sampling times was random with respect to demographic characteristics.

Table 5

Demographic Characteristics of Participants in Time 1 and Time 2

| Sample characteristics | Time 1 | Time 2 |
|--|-------------|------------|
| <i>N</i> | 176 | 77 |
| Age | 3-9 yrs | 5-11 yrs |
| Gender | | |
| Boys | 93 (52.8%) | 42 (54.5%) |
| Girls | 83 (47.2%) | 35 (45.5%) |
| Risk Groups | | |
| Economic disadvantage | 104 (59%) | 49 (64%) |
| Developmental delay | 22 (13%) | 10 (13%) |
| Economic disadvantage & Developmental delay | 50 (28%) | 18 (23%) |
| Ethnicity | | |
| African American | 126 (71.6%) | 57 (74%) |
| Caucasian | 38 (21.6%) | 13 (16.9%) |
| Hispanic | 9 (5.1%) | 5 (6.5%) |
| Other | 3 (1.7%) | 2 (2.6%) |

Description of the variables. Two dependent variables were investigated in this study: school adjustment and academic achievement. School adjustment was measured by the composite adaptive skills scale of the BASC-TRS which encompasses four prosocial behaviors: adaptability, social skills, study skills, and leadership. The academic achievement scale is a global score which encompasses ratings of four subject matters: reading/language arts, math, science, and social studies. The independent variable was the children's temperament, which consisted of four temperament dimensions: inhibition, persistence, negative emotionality, and activity level. Additionally, the third research question involved examining the four temperament dimensions from the initial study as predictors of the outcomes of the current study.

This added the four dimensions of temperament from Time 1 as additional independent variables.

Means and standard deviations for outcome variables. Table 6 presents the means and standard deviations for the outcome variables. The academic achievement scores of the participants ranged from 4 to 16 ($M = 10.18$, $SD = 3.14$). The skewness was $-.29$ and the kurtosis was $-.31$, both of which are considered appropriate for most psychometric purposes. The adaptive skill variables were as follows: adaptability ranged from 9 to 24 ($M = 14.34$, $SD = 2.56$), social skills ranged from 11 to 44 ($M = 25.08$, $SD = 8.04$), leadership ranged from 7 to 36 ($M = 17.22$, $SD = 6.11$), study skills ranged from 4 to 44 ($M = 23.99$, $SD = 8.88$), and the composite adaptive skills ranged from 43 to 148 ($M = 80.62$, $SD = 23.43$) with skewness of 1.04 and Kurtosis of $.89$.

Table 6

Means and Standard Deviations of the Composite Adaptive Skills Scale Scores and Academic Achievement

| | Mean | Standard Deviation |
|---------------------------|-------|--------------------|
| Composite Adaptive Skills | 80.62 | 23.43 |
| Academic Achievement | 10.18 | 3.14 |

Note. $N = 77$ Composite Adaptive Skills; $N = 72$ Academic Achievement.

Means and Standard Deviations for Predictive Variables. Table 7 presents the means and standard deviations for the four temperament variables for the sample of this study. The participants' scores of inhibition ranged from 15 to 63 ($M = 36.60$, $SD = 9.95$). The skewness was $.11$ and the kurtosis was $-.01$. Persistence ranged from 12 to 53 ($M = 29.86$, $SD = 9.62$); the skewness was $.59$ and the kurtosis was $-.27$. Negative emotionality ranged from 11 to 54 ($M =$

31.04, $SD = 10.86$); the skewness was $-.08$ and the kurtosis was $-.66$. Activity level ranged from 7 to 27 ($M = 16.99$, $SD = 4.41$); the skewness was $-.14$ and the kurtosis was $-.23$.

Table 7

Means and Standard Deviations of the TABC scale

| Temperament Scale | Mean | Standard Deviation |
|-----------------------|-------|--------------------|
| Inhibition | 36.60 | 9.96 |
| Persistence | 29.86 | 9.62 |
| Negative Emotionality | 31.04 | 10.87 |
| Activity Level | 16.99 | 4.41 |

Note. $N = 77$.

Additionally, means and standard deviations were obtained by gender and eligibility for special education for the independent and dependent variables. Table 8 presents the means and standard deviations for the boys and girls in the sample group. Only one variable (activity level) had significant differences in the means between boys and girls ($M = 17.98$, $SD = 4.06$) and ($M = 15.80$, $SD = 4.58$), respectively. However, Levene's test for equality of variances showed no significant differences between the girls and boys in the other variables with respect to the temperament dimensions.

Table 8

Means and Standard Deviations of the TABC by Gender

| Temperament Scale | Boys | Girls | <i>P</i> values |
|-----------------------|-------|-------|-----------------|
| Inhibition | | | |
| Means | 37.60 | 35.40 | .98 |
| SD | 10.47 | 9.30 | |
| Persistence | | | |
| Means | 28.62 | 31.34 | .23 |
| SD | 7.77 | 11.40 | |
| Negative Emotionality | | | |
| Means | 31.55 | 30.43 | .15 |
| SD | 9.86 | 12.09 | |
| Activity Level | | | |
| Means | 17.98 | 15.80 | .38* |
| SD | 4.06 | 4.58 | |

Note. $N = 77$ (Boys = 42; Girls = 35).

* $p < .05$.

Table 9 shows that when the temperament dimensions were compared by eligibility for special education, no significant differences were found. Levene's test for equality of variances showed that the variances in the temperament dimensions for children who were identified as eligible for special education did not differ significantly from those of children who were not eligible for special education.

Table 9

Means and Standard Deviations on the TABC Scale by Eligibility for Special Education

| Temperament Scale | Eligible | Not Eligible | <i>P</i> values |
|-----------------------|----------|--------------|-----------------|
| Inhibition | | | |
| Means | 38.18 | 35.74 | .52 |
| SD | 10.02 | 9.90 | |
| Persistence | | | |
| Means | 27.66 | 31.04 | .27 |
| SD | 8.65 | 9.98 | |
| Negative Emotionality | | | |
| Means | 34.00 | 29.44 | .15 |
| SD | 11.91 | 10.01 | |
| Activity Level | | | |
| Means | 17.14 | 16.90 | .20 |
| SD | 3.88 | 4.70 | |

Note. $N = 77$ (Not eligible = 50; Eligible = 27).

* $p < .05$.

As mentioned above, the third research question involves examining the influence of the four temperament dimensions of the initial study on the outcomes of the current study. Thus, descriptive statistics were also obtained for the four dimensions of temperament in Time 1.

Table 10 presents the means and standard deviations for the four temperament variables for the samples in the initial study. The scores for inhibition ranged from 11 to 57 ($M = 32.53$, $SD = 11.31$) with skewness of .02 and kurtosis of -.56. Persistence ranged from 8 to 56 ($M = 32.75$, $SD = 11.78$); the skewness was .06 and the kurtosis was -.75. Negative emotionality ranged from 8 to 56 ($M = 24.14$, $SD = 12.26$); the skewness was .95 and the kurtosis was .03, and the activity level ranged 4 to 28 ($M = 14.89$, $SD = 5.92$) with the skewness of .46 and kurtosis of -.26.

Table 10

Means and Standard Deviations of the TABC scale scores of Time 1

| TABC Scale | Mean | Standard Deviation |
|-----------------------|-------|--------------------|
| Inhibition | 32.53 | 11.31 |
| Persistence | 32.75 | 11.78 |
| Negative Emotionality | 24.14 | 12.26 |
| Activity Level | 14.89 | 5.92 |

Note. $N = 77$.

Table 11 presents the means and standard deviations for the boys and girls for Time 1. No significant differences were found between girls and boys in the sample with respect to the temperament dimensions.

Table 11

Means and Standard Deviations of the TABC of Time 1 by Gender

| Temperament Scale | Boys | Girls | <i>P</i> values |
|-----------------------|-------|-------|-----------------|
| Inhibition | | | |
| Means | 32.55 | 32.51 | .80 |
| SD | 11.27 | 11.53 | |
| Persistence | | | |
| Means | 30.64 | 35.28 | .13 |
| SD | 10.68 | 12.67 | |
| Negative Emotionality | | | |
| Means | 25.24 | 22.83 | .37 |
| SD | 13.16 | 11.12 | |
| Activity Level | | | |
| Means | 15.81 | 13.80 | .66 |
| SD | 5.91 | 5.83 | |

Note. $N = 77$ (Boys = 42; Girls = 35).

* $p < .05$.

Table 12 shows that no significant differences were found in temperament between children who were identified as eligible for special education and those who were not eligible for special education in Time 1.

Table 12

Means and Standard Deviations of TABC Scale in Time 1 by Eligibility for Special Education

| Temperament Scale | Eligible | Not Eligible | <i>P</i> values |
|-----------------------|----------|--------------|-----------------|
| Inhibition | | | |
| Means | 32.37 | 32.62 | .74 |
| SD | 10.87 | 11.65 | |
| Persistence | | | |
| Means | 32.00 | 33.16 | .48 |
| SD | 11.46 | 12.04 | |
| Negative Emotionality | | | |
| Means | 26.33 | 22.96 | .43 |
| SD | 13.01 | 11.80 | |
| Activity Level | | | |
| Means | 13.92 | 15.41 | .26 |
| SD | 5.30 | 6.22 | |

Note. *N* = 77 (Not eligible = 50; Eligible = 27).

* $p < .05$.

Tables 13 and 14 present the means and standard deviations for the composite adaptive skills scale and academic achievement by gender and eligibility for special education, respectively. Levene's test for equality of variances showed that there were no significant differences between the girls and boys in the sample on any of the variables. Also, the variances of children who were identified as eligible for special education and of children who were not eligible for special education did not differ significantly from each other.

Table 13

*Means and Standard Deviations of the Composite Adaptive Skills Scale and Academic**Achievement by Gender*

| | Boys | Girls | <i>P</i> values |
|---------------------------|-------|-------|-----------------|
| Academic Achievement | | | |
| Mean | 9.70 | 10.76 | .59 |
| SD | 3.24 | 2.97 | |
| Composite Adaptive Skills | | | |
| Means | 76.43 | 85.66 | .21 |
| SD | 21.80 | 24.62 | |

Note. $N = 72$ (Boys = 39; Girls = 33 for Academic Achievement); $N = 77$ (Boys = 42; Girls = 35 for Composite Adaptive Skills).

* $p < .05$.

Table 14

*Means and Standard Deviations of the Composite Adaptive Skills and Academic Achievement by**Eligibility for Special Education*

| Temperament Scale | Eligible | Not Eligible | <i>P</i> values |
|---------------------------|----------|--------------|-----------------|
| Academic Achievement | | | |
| Means | 9.84 | 10.36 | .85 |
| SD | 2.97 | 3.25 | |
| Composite Adaptive Skills | | | |
| Means | 78.59 | 81.72 | .78 |
| SD | 22.46 | 24.09 | |

Note. $N = 72$ (Not eligible = 47; Eligible = 25 for Academic Achievement); $N = 77$ (Not eligible = 50; Eligible = 27 for Composite Adaptive Skills).

* $p < .05$.

Two types of *t*-tests were performed. The first, independent *t*-tests were performed to compare the means and standard deviations of the four temperament variables (inhibition, persistence, negative emotionality, and activity level) between the lost ($N = 99$) group and the remaining ($N = 77$) group of the initial sample in order to determine if the means differed significantly between the two groups. A significant difference between them would have indicated that the attrition between the two studies was selective. Table 15 shows that all tests yielded non-significant differences in means at the $p < .05$ level. Levene's test for the equality of variances indicated that the variances in each of the temperament dimensions for the lost and remaining participants also did not differ significantly from each other. These findings indicate that the attrition that occurred between the first and second sampling times was random with respect to temperament differences.

Table 15

Means and Standard Deviations of TABC Scale in Time 1 and Time 2 for the Initial Sample

| Temperament Scale | Time 1 | Time 2 | <i>P</i> values |
|-----------------------|--------|--------|-----------------|
| Inhibition | | | |
| Means | 32.97 | 32.57 | .46 |
| SD | 11.86 | 11.34 | |
| Persistence | | | |
| Means | 32.85 | 32.97 | .70 |
| SD | 11.90 | 11.65 | |
| Negative Emotionality | | | |
| Means | 25.53 | 23.87 | .39 |
| SD | 12.88 | 12.34 | |
| Activity Level | | | |
| Means | 15.15 | 14.82 | .95 |
| SD | 5.75 | 5.90 | |

$N = 99$ in Time 1, $N = 77$ in Time 2.

* $p < .05$.

The second type of *t*-tests was paired sample tests, which were performed in order to compare the scores of the individuals in the sample in this study (Time 2) to their scores in the initial study (Time 1). The purpose of these *t*-tests was to determine if the children's scores on the TABC scales varied over time. Table 16 shows that the TABC scale scores for the children in the sample in this follow-up study (N = 77) differed significantly from Time 1 to Time 2. The participant children were found to have higher scores in inhibition, negative emotionality, and activity level in Time 2 and had a lower level of persistence. Levene's test for the equality of variances indicated that the variances in each of the temperament dimensions for the sample of this study also differed significantly from their scores in Time 1.

Table 16

Means and Standard Deviations of TABC Scale in Time 1 and Time 2 for the Follow-up Sample

| Temperament Scale | Time 1 | Time 2 | <i>t</i> values |
|-----------------------|--------|--------|-----------------|
| Inhibition | | | |
| Means | 32.53 | 36.60 | -2.86** |
| SD | 11.31 | 9.95 | |
| Persistence | | | |
| Means | 32.75 | 29.86 | 2.23* |
| SD | 11.78 | 9.62 | |
| Negative Emotionality | | | |
| Means | 24.14 | 31.04 | -5.04** |
| SD | 12.26 | 10.86 | |
| Activity Level | | | |
| Means | 14.90 | 16.99 | -2.92** |
| SD | 5.92 | 4.41 | |

N = 77.

* $p < .05$, ** $p \leq .005$.

Correlations within the Temperament Scales. Table 17 shows the correlations within the four temperament dimensions. Inhibition was positively correlated with negative

emotionality at $r = .41$, ($p < .01$) and negatively correlated with persistence at $r = -.51$ ($p < .01$). Activity level was positively correlated with negative emotionality at $r = .59$ ($p < .01$) and negatively correlated with persistence at $r = -.72$ ($p < .01$). Persistence was negatively correlated with negative emotionality at $r = -.70$ ($p < .01$). These intra-correlation tests of the temperament scales show that children who had a tendency to be inhibited also tended to have a high level of negative emotionality and a low level of persistence. Children who had a tendency to exhibit negative emotionality tended to have a high level of activity and a high tendency toward inhibition and a low level of persistence. Children who tended to have a high activity level tended to have a low persistence level and a high negative emotionality. Children who exhibited a high level of persistence tended to have a low level of inhibition, activity, and negative emotionality. Also, these correlations among temperament dimensions indicate that multicollinearity did not exist between the predictor variables (see linearity and collinearity section above).

Table 17

Pearson Correlations within TABC Scales

| TABC Scale | Inhibition | Activity | Negative Emotionality |
|-----------------------|------------|----------|-----------------------|
| Inhibition | - | - | - |
| Activity | .14 | - | - |
| Negative Emotionality | .41** | .59** | - |
| Persistence | -.51** | -.72** | -.70** |

Note. $N = 77$.

** $p < .01$.

Research Questions

This study investigated three research questions. The first two questions related to the follow-up data (Time 2). The third question is concerned with the influence of the predictors of the initial study on the follow-up outcomes over time. This section addresses the results for each research question. For the research questions, the following variables were used: the transformed variable (log transformed adaptive skills) of the composite adaptive skills scale of the BASC-TRS was used in the following analyses. This variable encompasses four prosocial behaviors: adaptability, social skills, study skills, and leadership. A global score of academic achievement encompasses ratings of four subject matters: reading/language arts, math, science, and social studies. The independent variable was the children's temperament, which consisted of four temperament dimensions: inhibition, persistence, negative emotionality, and activity level. For both persistence of Time 2 and negative emotionality of Time 1, the transformed variables were used: log transformed persistence and log transformed negative emotionality.

Research question one. What is the relationship between the four dimensions of temperament (inhibition, persistence, negative emotionality, and activity level), school adjustment (the composite adaptive skills), and academic achievement among children at-risk? This research question investigates the concurrent relationships between the variables in the follow-up study (Time 2) data. Bivariate correlations were used to address this question. Scatterplots were formed, as previously reported in the EDA section; the relationships between the variables were found to be linear. Pearson's correlation coefficients (r) were computed to explore the relationships between the characteristics of children's temperament, school adjustment, and academic achievement. First, Pearson's correlation coefficient was performed for the two dependent variables; academic achievement and log adaptive skills variables. Those two variables had a positive significant correlation at $r = .64$, $p < .01$.

Second, correlations between log transformed adaptive skills and the four dimensions of temperament were computed. Table 18 shows that negative emotionality had a significant correlation with the log transformed adaptive skills ($r = -.23, p < .05$). The other dimensions of temperament did not have significant correlations with the log transformed adaptive skills. When correlations were performed by gender, the log transformed adaptive skills significantly correlated for girls with negative emotionality, log transformed persistence, and activity level at $r = -.46, (p < .01)$, at $r = .38, (p < .05)$, and $r = -.52, (p < .01)$, respectively. No significant correlations were found for boys. To assess whether the difference in the correlations between girls and boys was meaningful, the *split file* command was used to compute the correlations. Then, those coefficients were converted to z scores and then a z score of the differences between these correlations was calculated. The findings indicated that only two correlations were significantly different in girls and boys. That is, the correlations between log transformed adaptive skills and activity level and log transformed adaptive skills and negative emotionality ($r = .78, z = 3.54 p < .001$) and ($r = .52, z = 2.36, p < .01$), respectively.

Pearson's correlation coefficients were also calculated based on subgroups, children with identified disabilities (eligible for special education) versus children with non-identified disabilities (not eligible for special education). Table 19 shows that log transformed adaptive skills significantly correlated with negative emotionality and activity level ($r = -.42$, and $-.41, ps < .05$), respectively, for children with identified disabilities. However, the *Split file* command, as described above, showed that the raw scores and the z scores were not significant. Thus, the correlations between those two groups were not significantly different.

Table 18

Pearson Correlation between TABC Scale and the Log Transformed Adaptive Skills for the Total Sample and by Gender

| Log Transformed Adaptive Skills | Temperament Scales | | | |
|---------------------------------|--------------------|-----------------------|-----------------------------|----------------|
| | Inhibition | Negative Emotionality | Log Transformed Persistence | Activity Level |
| Total | -.18 | -.23* | .22 | -.19 |
| Boys | -.09 | .06 | -.01 | .26 |
| Girls | -.25 | -.46** | .38* | -.52** |

Note. $N = 77$ (Boys = 42; Girls = 35).

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

Table 19

Pearson Correlations between TABC Scale and the Log Transformed Adaptive Skills by Eligibility for Special Education

| Log Transformed Adaptive Skills | | Temperament Scales | | | |
|---------------------------------|--------------|--------------------|-----------------------|-----------------------------|----------------|
| | | Inhibition | Negative Emotionality | Log Transformed Persistence | Activity Level |
| Log Transformed Adaptive Skills | Eligible | -.27 | -.42* | .18 | -.41* |
| | Not Eligible | -.12 | -.08 | .24 | -.08 |

Note. $N = 77$ (Non-eligible = 50; Eligible = 27).

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

Third, correlations between academic achievement and the four dimensions of temperament were performed. Table 20 shows that academic achievement was significantly

correlated with two temperament dimensions; log transformed persistence ($r = .31, p < .01$) and activity level ($r = -.27, p < .05$). The correlation coefficients of academic achievement for boys showed no significant correlations, whereas for girls there were three significant correlations with negative emotionality, log transformed persistence, and activity level ($r = .39, .42, ps < .05$) and ($r = -.62, p < .01$), respectively. To assess whether the difference between gender was meaningful, z scores were calculated. The correlations between achievement and activity, and achievement and negative emotionality were significantly different in girls and boys ($r = .69, z = 3.23, p < .01$) and boys ($r = .52, z = 2.21, p < .05$), respectively.

Table 20

Pearson Correlation Coefficients between TABC Scale and Academic Achievement for the Total Sample and by Gender

| Achievement | Temperament Scales | | | |
|-------------|--------------------|-----------------------|-----------------------------|----------------|
| | Inhibition | Negative Emotionality | Log Transformed Persistence | Activity Level |
| Total | -.10 | -.12 | .31** | -.27* |
| Boys | .06 | .13 | .19 | .08 |
| Girls | -.30 | -.39* | .42* | -.62** |

Note. $N = 72$ (Boys = 39; Girls = 33).

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

Pearson correlation coefficients were also performed by special education eligibility, i.e., children with identified disabilities versus children without identified disabilities. Only one correlation between academic achievement and log transformed persistence for children not identified with disabilities ($r = .29, p < .05$) was statistically significant. *Split file* command was

used, as described above, to assess whether the difference between the correlations on those groups was meaningful. The raw score and the *z* scores showed that there were no significant difference in children eligible for special education and children who were not eligible.

Table 21

Pearson Correlation Coefficients between TABC Scale and Academic Achievement by Eligibility for Special Education

| | | Temperament Scales | | | |
|-------------|-----------------|--------------------|--------------------------|-----------------------------------|----------------|
| | | Inhibition | Negative Emotionality | Log Transformed Persistence | Activity Level |
| Achievement | Eligible | -.09 | -.21 | .33 | -.26 |
| | Not Eligible | -.09 | -.05 | .29* | -.28 |

Note. *N* = 72 (Non-eligible 47; Eligible = 25).

* *p* < .05.

Research question two. To what extent do the four dimensions of temperament (inhibition, persistence, negative emotionality, and activity level) explain variations in concurrent school adjustment and academic achievement among children at-risk? This research question examines the follow-up data to (a) understand how the values of the school adjustment and academic achievement variables (criterion variables) change when any one of the predictor variables (inhibition, persistence, negative emotionality, and activity level) are varied while the other predictors are held fixed and (b) to determine the percentage of the variation in the criterion variables for which each predictor can account.

Stepwise multiple regression analyses were performed to address this research question.

Prior to conducting these procedures, the assumptions relating to these analyses were checked for

multicollinearity and for linear relationships between the predictors and the outcome variables as well as checking the variables for normality (see the first section of this chapter). The EDA that was reported in the first section of this chapter found linear relationships between the variables and detected no multicollinearity problems.

Two stepwise multiple regression analyses were conducted. The first was for the academic achievement score which was regressed against the four temperament dimension scores, and the second was for the log transformed adaptive skills which was regressed against the four temperament dimensions. In the stepwise method, the regression equation is constantly being assessed to identify any redundant predictors that can be removed. Decisions about the order of entering the predictors into the model are based on a purely mathematical criterion. Each time a predictor is added to the equation, a removal test is made of the weakest predictor (Field, 2009).

In the first stepwise regression analysis (Table 22), the criterion variable was academic achievement and the predictive variables were inhibition, log transformed persistence, negative emotionality, and activity level. Log transformed persistence was the only predictor which entered the regression model; it significantly contributed to the model. Log transformed persistence accounted for 9.8% of the variance in academic achievement ($R^2 = .098$, adjusted $R^2 = .085$, $p < .01$). The standardized $\beta = .314$ which indicates that as log transformed persistence's score increases by one standard deviation ($SD = 0.33$), academic achievement score increases by .314 standard deviations. The standard deviation for academic achievement is 3.15, and so this constitutes a change of 0.99. Hence, for every increase of 0.33 in a child's score in log transformed persistence, academic achievement score increases by 0.99. The F -ratio and its significance ($F = 7.64$, $p < .01$) indicated that the regression model significantly improves the

ability to predict the outcome variable and it is unlikely to have happened by chance. The remaining variables (inhibition, negative emotionality, and activity level) were excluded from the equation because they did not reach the necessary statistical criterion. So, they fail to significantly predict academic achievement.

Table 22

Stepwise Multiple Regression for TABC Scale Predicting Academic Achievement

| TABC Scale | <i>B</i> | Standard Error of <i>B</i> | β |
|-------------|----------|----------------------------|---------|
| Persistence | 2.95 | 1.07 | .314 |

Note: $N = 72$, $R^2 = .098$, adjusted $R^2 = .085$, $p < .01$.

In the second stepwise regression analysis (Table 23), the criterion variable was log transformed adaptive skills and the predictive variables were inhibition, log transformed persistence, negative emotionality, and activity level. Negative emotionality was the only predictor which entered the regression model; it had a statistically significant direct influence on log transformed adaptive skills, accounting for 5.3% of the variance ($R^2 = .053$, adjusted $R^2 = .040$, $p < .05$). The standardized $\beta = -.230$ which indicates that for every one standard deviation ($SD = 10.87$) increase in the negative emotionality data, log transformed adaptive skills score ($SD = .27$) decreases by 0.06. The *F*-ratio and its significance ($F = 4.20$, $p < .05$) indicated that the regression model significantly improves the ability to predict the outcome variable and it is unlikely to have happened by chance. The remaining variables (inhibition, log transformed persistence, and activity level) were excluded from the equation because they did not reach the necessary statistical criterion. So, they fail to significantly predict log transformed adaptive skills.

Table 23

Stepwise Multiple Regression for TABC Scale Predicting Log Transformed Adaptive Skills

| TABC Scale | <i>B</i> | Standard Error of <i>B</i> | β |
|-----------------------|----------|----------------------------|---------|
| Negative Emotionality | -.006 | .003 | -.230 |

Note: N = 77, R² = .053, adjusted R² = .040, p < .05.

Research question three. To what extent do the four dimensions of temperament from time 1 explain the variations in school adjustment and academic achievement among children at-risk after a two year interval? This research question investigated the relative contributions of the four temperament dimensions from Time 1 to the outcome variables two years later (Time 2).

The four temperament dimensions were inhibition, persistence, negative emotionality, and activity level. However, because negative emotionality was non-normal, the log transformed negative emotionality variable was used instead. The statistical analysis approaches that were used in this question were similar to those that were utilized for the second question. Prior to conducting the multiple regression analyses, scatterplot matrices were formed and bivariate correlation coefficients were obtained to examine the relationships between the temperament dimensions of Time 1 and the outcomes of Time 2. A visual inspection of the scatterplot matrix showed that the variables are linearly related, however, there were no significant relationships between the independent and dependent variables. Then, stepwise multiple regression was employed. Multiple regression analyses were conducted separately for the academic achievement and for the log composite adaptive skills. The results showed that no variables entered into the equation model. Another method, forced entry (simultaneous) regression, was employed in order to confirm the results and provide numbers for the reader. The results were similar to those from the stepwise method; that is, the four dimensions of temperament failed to significantly

predict the criterion variables (academic achievement and school adjustment) after two year interval. The reported values in the simultaneous regression were as follows: for academic achievement, the multiple correlation coefficient was .22 ($R^2 = .05$) and the adjusted R^2 was -.00, using all the predictors simultaneously. The ANOVA table showed that ($F = .89, p = .48$) which was not significant and indicated that the combination of the predictors did not significantly predict academic achievement. The coefficients table indicated that none of the variables contributed to the equation for predicting academic achievement; inhibition ($\beta = .13, t = .98, p = .331$), persistence ($\beta = .05, t = .28, p = .78$), activity level ($\beta = -.17, t = -.90, p = .37$), and log transformed negative emotionality ($\beta = .23, t = 1.43, p = .16$). For school adjustment, the multiple correlation coefficient was .17 ($R^2 = .03$) and the adjusted R^2 was -.02, using all the predictors simultaneously. The ANOVA table showed that ($F = .56, p = .69$) which was not significant and indicated that the combination of the predictors did not significantly predict academic achievement. The coefficients table indicated that none of the variables contributed to the equation for predicting academic achievement: inhibition ($\beta = -.08, t = -.62, p = .53$), persistence ($\beta = .07, t = .40, p = .70$), activity level ($\beta = -.06, t = -.31, p = .75$), and log transformed negative emotionality ($\beta = -.04, t = -.24, p = .81$).

CHAPTER V

Discussion

The aim of this study was to investigate individual differences between children at-risk in relation to their educational outcomes. Specifically, the role of children's temperament in school adjustment and academic achievement was investigated with children at-risk. This research study is based on resilience theory (Werner, 1971, 1982), in which temperament traits can present either potential risk or protection for children at-risk. Three research questions were investigated to determine both the concurrent relationships and the longitudinal predictive relationships between children's temperament, school adjustment, and academic achievement. The first and second research questions were related to the data from the current study (Time 2). The third question was concerned with the influence of the predictors from the initial study (Time 1) on the outcomes of the follow-up data after a two year interval. Specifically, the research questions were:

1. What is the relationship between the four dimensions of temperament (inhibition, persistence, negative emotionality, and activity level), school adjustment (composite adaptive skills), and academic achievement among children at-risk?
2. To what extent do the four dimensions of temperament (inhibition, persistence, negative emotionality, and activity level) explain variations in concurrent school adjustment and academic achievement among children at-risk?

3. To what extent do the four dimensions of temperament in Time 1 explain the variations in school adjustment and academic achievement among children at-risk after a two year interval?

This chapter discusses the meaningful findings about those research questions in relation to existing literature and theory. Limitations of the study are then addressed and directions for future research are provided.

The results relating to temperament and school adjustment were very similar to those relating to temperament and academic achievement. That is, three major findings about these areas were consistent with previous research: (a) significant relationships were found for both areas of interest, school adjustment and academic achievement, in relation to children's temperament, (b) the magnitude of the relationships primarily fell within a weak to moderate range, and (c) negative emotionality and persistence (log transformed persistence) were found to be the most significant and predictive variables for school adjustment and academic achievement, respectively. Some variations, which will be addressed later, existed in the results. The findings are presented below in three sections. The first presents the findings that relate temperament to school adjustment. The second provides the findings that relate temperament to academic achievement. The third section discusses the findings as they relate to gender and to children with disabilities.

Temperament and School Adjustment

Temperament was found to have a significant association with school adjustment. Specifically, negative emotionality had a significant correlation ($r = -.23, p < .05$) with school adjustment (log transformed adaptive skills). This level of correlation is considered weak. Interpretations of the strength of correlations have been determined by this investigator's

professional judgment, taking into account data from reviewed studies, the literature on education, and psychological research methodology, all of which indicated that assessments of personality rarely report a significance of $r = .80$ or higher (McMillan, 2008; Shortell, 2001). Thus, in this study, correlations above $.60$ are considered to be strong; correlations between $.40$ and $.60$ are moderate, and those below $.40$ are considered weak (McMillan, 2008; Shortell, 2001).

The findings of this study are in line with those of reviewed studies (Blair et al., 2004; Liew et al., 2004; Nelson et al., 1999; Reed-Victor, 2004). In the reviewed studies, negative emotionality had the most significant negative correlation with school adjustment and positively correlated with both internalizing and externalizing problems (Blair et al., 2004; Liew et al., 2004; Nelson et al., 1999). Almost all the significant correlations for temperament dimensions and school adjustment fell within the range of moderate to weak, ranging from $r = .15, p < .01$ to $r = .46, p < .001$. The only two correlations that were higher were reported for adjustment and self-regulation ($r = .55, p < .05$) and for negative emotionality and adjustment at $r = .72, p < .001$ (Bouffard et al., 2005; Liew et al., 2004), respectively. In addition, negative emotionality was found to be the only predictor of school adjustment (log transformed adaptive skills), accounting for 5.3% of the variance ($R^2 = .053$, adjusted $R^2 = .040, p < .05$).

This finding of the influence of negative emotionality on school adjustment is expected because a child with negative emotionality can find social situations, such as the classroom, challenging. According to Martin and Bridger (1999), negative emotionality is the most single predictive temperament trait for negative social outcomes and it is often associated with externalizing and internalizing behaviors. A child with negative emotionality may present a challenge to the teachers. These children are more likely to exhibit inappropriate behaviors and

have difficulty regulating their emotions in ways that will allow them to adhere to the demands of the classroom environment such as sitting still, completing a task, sharing with peers, and waiting in line. These demands often require some level of regulation of emotion and a delay in the fulfillment of individual desires which may be lacking in children with negative emotionality. However, from a resilience perspective, a child who has a high level of negative emotionality will not necessarily develop adjustment difficulties, because the role of the environment and the interaction between the child and the environment can increase or minimize the adjustment problems that the child may face. Thus, a child with negative emotionality will only be at high risk for adjustment difficulty and failure in school if the environment provides him/her with little support for self-regulation and if the environment does not respond to the child's individualized needs. Negative emotionality is influenced by various aspects of the environment (Blair, 2002). Therefore, identifying children's behavioral tendencies at early ages is essential for providing appropriate individualized support to help such children adjust well to the demands of the classroom and for helping their teachers to provide a suitable environment. For example, teachers can emphasize children's social-emotional competencies, such as being able to communicate needs, wants, and thoughts verbally, learning to follow directions and taking turns, and being sensitive to other children's feelings (Blair, 2002). Additionally, a teacher who is aware of biologically-based individual differences in negative emotionality is more likely to recognize provocative situations for those children before they occur and may be able to adopt a proactive approach that uses simple techniques such as reminding the child of the rules and allowing the child to monitor his/her own displays of negative emotionality.

Temperament and Academic Achievement

Similar to the findings about school adjustment in relation to temperament, the results of the influence of temperament on academic achievement were found to be consistent with those of previous research (Bramlett et al., 2000; Guerin et al., 1994; Li et al., 2009; Martin et al., 1988; Martin & Holbrook, , 1985). That is, children's temperament was significantly correlated with academic achievement. Specifically, task orientation (high persistence, low activity level, and low distractibility) was found to have the most highly significant relationship with academic achievement as well as being a predictor of academic achievement.

In this study, significant associations were found between temperament and academic achievement as well. Specifically, persistence (log transformed persistence) and activity level were significantly correlated with academic achievement at $r = .31, p < .01$ and $r = -.27, p < .05$, respectively. The strength of these two correlations is considered weak using the rule described above, and these findings are consistent with previous research. In the reviewed studies, all significant correlations for the two dimensions of temperament (persistence and activity level) and academic achievement fell within the range of weak to moderate. In addition, persistence (log transformed persistence) was found to be the only predictor of academic achievement, accounting for 9.8% of the variance ($R^2 = .098$, adjusted $R^2 = .085, p < .01$). These findings are consistent with the results of the reviewed studies. Persistence and activity level were the variables that most significantly correlated with academic achievement. Persistence accounted for 46.4% of the significant correlations, which ranged from moderately to weakly positive. Activity level accounted for 25% of the significant correlations, which ranged from moderately to weakly negative. Both persistence and activity level can be expected to have significant relationships with academic achievement because achievement in the academic realm requires a

child's attention as well as his/her ability to continue in a task that is difficult. In addition academic success requires that a child to be able to control their gross motor activity so that they can sit still to complete a task. Research has indicated that the abilities to focus attention, persist at tasks, and regulate emotions are essential for healthy development and academic success (Kerns, Esso, & Thompson, 1999; Semrud-Clikeman, Nielsen, & Clinton, 1999). Similar to the outcomes of a high level of negative emotionality as described above, a low level of task persistence and/ or a high activity level can present a barrier for a child and can also inhibit the child from being able to achieve academically and succeed in school. However, from a resilience perspective, these undesirable behavior tendencies can be modified and regulated if other factors in the environment respond effectively to those behaviors using a goodness of fit approach and/or if self-regulation skills are taught. Studies have shown that children at-risk who can self-regulate their emotions and behaviors have higher scores in reading, math and vocabulary (McClelland et al., 2007). Again, the development of social and emotional competencies is necessary in order to achieve academically. Learning occurs in an environment, and within relationships. A teacher who is attuned to temperament differences is more likely to be able to provide a comprehensive platform for the development of the skills needed for learning (Blair, 2002). As previously described, goodness of fit derives from two approaches. The first, involves teaching the child self-regulation skills and techniques for monitoring him/herself. The second approach involves providing a sensitive teacher who is aware of these biologically-based individual differences. A teacher who is able to provide a good fit for the child can anticipate stressful situations that may occur and can predict future behaviors. S/he will be able to demonstrate a proactive approach using simple techniques, as previously

mentioned, that enable the child to be aware of his/her emotions and behaviors and monitor them in classroom situations.

Variations in the Findings

While the relationships between the independent and the outcome variables were consistent with the results of the reviewed studies, as described above, this consistency only held true for the concurrent data of the current study (Time 2). The third research question, which investigated the predictive relationships between temperament and school adjustment and temperament and academic achievement longitudinally, was not consistent with the results of the reviewed studies (see literature review). The reviewed studies found significant relationships between children's temperament and their educational outcomes when they were measured over time. However, this present study found that children's temperament identified in Time 1 showed no significant relationships with any of the outcome variables in Time 2. Additionally, the children's temperament profiles that were identified in Time 1 failed to significantly predict school adjustment or academic achievement after the two year interval. The first explanation that can be offered for such findings, in which no significant relationships occurred in the longitudinal data but significant relationships occurred in the concurrent data, is rater bias such as the *halo effect*, that is, that the teacher's ratings on one instrument were influenced by the other instrument (McMillan, 2008). For example, a student with a high level of academic achievement may influence the teacher ratings of the student's temperament or vice versa. For the concurrent data in the present study, only teacher ratings were used for all the examined variables. Thus, teacher bias seems to be a possible explanation for this study's having found significance in the concurrent measures (Time 2), in which the same teachers rated the students on all the examined variables, but did not find significance when the first set of teachers' ratings

in Time 1 were correlated with the ratings of the Time 2 teachers, since the teachers for any given student were not the same in the two studies. However, it is important to note that the 72 teachers in Time 2 rated 77 children; this means that one teacher almost always rated only one student, not several students. Thus, the scores of the children were independent of each other. Because each teacher as a general rule rated only one child, any tendency toward teacher bias would have been minimized. Also, the strength of the correlations that were found in this study were weak and within the same range as those found in previous studies. If the findings of this study could completely be explained by teacher bias, stronger correlations would be expected as teacher bias should have overestimated the strength of the relationships. Another possible explanation for the absence of a relationship between the data in this present study with that of the previous time could be the role of maturation, that is, changes in terms of physical, social, and mental development that might have happened to the children as a result of the passage of time (McMillan, 2008). As shown in Table 16, the same children were found to score higher, after a two year interval, in inhibition, negative emotionality, and activity level, and lower in persistence. Research has indicated that with maturation children tend to learn to control their behaviors in public places (Kerns, Esso, & Thompson, 1999; Semrud-Clikeman, Nielsen, & Clinton, 1999). However, this might not apply to children at-risk who lacked resources and/or came from family poverty or low income. These children may have not received the interventions that they needed to aid their healthy development and promote their self-regulation skills. As a result, their negative or difficult temperament-based behaviors might have increased as a result of not receiving the interventions, such as providing a fitting environment or teaching them self-regulation skills, which they needed. However, this study is not able to support this

speculation as no data were collected about specific educational services or interventions the children had received during the two year interval.

A thorough examination of the characteristics of the reviewed studies (all tables in Appendices A, B, C, and D) was conducted to attempt to discover other potential explanations, besides teacher bias, for the above-described differences in the results of this study compared to those of the reviewed studies. Several noteworthy observations were found and speculations were made, as described below. First, almost all the reviewed studies that examined temperament and school adjustment longitudinally used parent ratings to determine the children's temperaments, but this present study used teacher ratings to determine children's temperaments in order to examine the relationship between temperament and school adjustment. Second, almost all the reviewed studies measured both prosocial and problem behaviors (e.g. internalizing, externalizing behaviors) to indicate school adjustment; however this present study examined only prosocial behaviors.

Parent ratings versus teacher ratings of school adjustment. Research has shown that, in general, parent ratings of children's temperaments have a stronger relationship with school adjustment than do teacher ratings of temperament (Bouffard et al., 2005). A reason for this may be that parents rate their children based on their standards of what the child must or must not do; whereas teachers rate children compared to other children in the classroom. In that sense, parent ratings of their children's behavioral tendencies may be stricter than those of teachers. Because teachers experience a wide range of problem behaviors in the classroom and have to deal with severe behaviors at times, they may be more tolerant of mild/moderate inappropriate behavior. This may be apparent from some of the items in the TABC scale. For instance, the teacher form of the TABC scale includes the following statements which the parent form does not include:

child gets upset by things that don't bother most other children and child's attention to teacher reading stories is shorter than other children. Therefore, a teacher's ratings may be influenced by the comparisons that teachers consciously and unconsciously make between the sample child and the other children in the classroom. Thus, teacher ratings for behavioral tendencies may not be as strong as those derived from parent ratings. Bouffard et al. found that eight out of 30 comparisons between parent and teacher ratings differed significantly; the correlations between parent ratings of temperament and school adjustment were stronger than those from teachers at $p < .05$. Another reason for this difference between parents and teachers ratings may be that teachers place a higher priority on academic behavior than on social behavior. If a child is inhibited but does well in their subject matter, a teacher may not consider his/her behavioral difficulty to be as great a problem as failing school or having poor math skills. Parents, however, may place a higher priority on their children's social behaviors than do teachers.

Problem behaviors versus prosocial behaviors. Again, almost all the reviewed studies measured both problem behaviors (e.g., internalizing, externalizing behaviors) and prosocial behaviors. However, this current study measured only prosocial behaviors (adaptability, social skills, study skills, and leadership) for school adjustment. Children's problem behaviors may receive more notice in the classroom than do their prosocial behaviors. To support this speculation, the correlations that were found between temperament and problem behaviors were stronger than the correlations that were found between temperament and prosocial behaviors in the reviewed studies. For instance, Nelson et al. (1999) reported a correlation between negative emotionality and positive social behaviors of $r = -.13$ and a correlation between the same temperament variable and externalizing behaviors of $r = -.36$.

Temperament, Gender, and Special Education

Differences in gender and eligibility for special education were found in this study. Activity level was found to be significantly different depending on gender; boys had a higher activity level than girls ($M= 17.98, SD = 4.06$), ($M= 15.80, SD = 4.58$), respectively. Previous research across countries and cultures has reported that boys tend to have a higher level of activity, impulsivity, emotional intensity, and low levels of shyness (Deater-Deckard et al., 2009; Eisenberg, Fabes, & Spinrad, 2006; Whiting & Edwards, 1988).

Also, three significant correlations were found for girls. Negative emotionality, activity level, and persistence were significantly correlated with the outcome variables of school adjustment and academic achievement (see Tables 16 and 18). The significant correlations that were found for girls may be explained by common perceptions about gender differences, which have also been supported by empirical research. For instance, research has found that boys are more likely to exhibit a higher activity level, impulsivity and emotional intensity than girls (Blair et al., 2004; Chen et al., 2009; Nelson et al., 1999; Prior et al., 2001). Boys tend to score higher in externalizing behaviors than girls. In turn, girls are found to have higher effortful control skills than boys as well as higher social competence and adjustment (Deater-Deckard, 2009; Jordan, McRorie, & Ewing, 2010; Liew et al., 2004). Girls have also been found to have higher scores on cooperative behavior, peer liking, and positive school attitudes (Chen et al., 2009).

As a result, teachers may be more tolerant of boys with high levels of activity and negative emotionality; therefore those behaviors may go unnoticed when boys exhibit them and may be considered within the normal acceptable range. If a girl, on the other hand, displays similar tendencies toward hyperactivity and negative emotionality, the teacher may easily notice it and consider it to be unacceptable behavior.

Differences between children with disabilities were investigated, utilizing data about children who were identified for special education under IDEA and comparing them with children who had no known disabilities. No significant differences were found for either of the two categories with regard to children's temperament. However, when eligibility for special education was examined using the correlation coefficients for both of the outcome variables, two significant correlations were found for children with disabilities. Negative emotionality and activity level were significantly correlated with school adjustment (log transformed adaptive skills) at $r = -.42$, and $-.41$, $ps < .05$, respectively. One significant correlation was found for children without known disabilities between persistence (log transformed persistence) and academic achievement at $r = .29$, $p < .05$. These findings for children with disabilities and for children without known disabilities are expected. First, as described previously in chapter two of this study, some disorders share the same symptoms as the behavioral tendencies in temperament. For example, both negative emotionality and activity level are symptoms for certain behavioral disorders as well as being temperament characteristics. As a result, a correlation between these two dimensions of temperament could be expected in children with disabilities. Second, the correlation between persistence (log transformed persistence) and academic achievement for children without known disabilities can be accounted for by the fact that persistence tends to have positive association with cognitive ability. According to Martin and Bridger (1999), an association between persistence and cognitive ability, typically between .25 and .40, has consistently been observed. However, IQ scores for the participant children was not collected for this study. It is also important to note that the sample size for children with disabilities was small ($n = 27$), therefore, the significance or the absence of significance in most of the statistical analyses may be due to this small sample size.

Limitations

Several threats to internal and external validity can be identified for this study. First, although an attempt was made to obtain information using various sources of information, the participating school systems restricted the researchers' access to parents, students, and/or school records. The only permitted access was to teachers, and that was based on principal and teacher consent. Therefore, the limited sources of information as well as the methods that were used to measure the examined variables may have influenced the results. The data were collected using a mono-method and a single informant; that is, only teacher ratings were used to provide the data on the children's temperament, school adjustment, and academic achievement. This can be a source of bias because teachers can consciously and subconsciously overestimate or underestimate their students' scores. This rater bias can reduce the reliability and validity with which the target constructs are measured (Judd, Smith, & Kidder, 1991). Various forms of teacher bias may have influenced the data. For example, the interpretation of the scales' items can be affected by the rater and thus can reflect the characteristics and perception of the rater of the items, as well as performance of the student. In particular, this is a difficulty because no training was provided to the teachers about how to rate the children or how to interpret the meaning of the various items. Other forms of bias which this study may have been subjected to include: leniency, severity, halo, horns, recency, negative events, and/or comparison (McMillan, 2008; Shepard, 2005), as described below. Leniency is the tendency to evaluate students positively, which is the opposite of severity, that is the tendency to avoid giving highly positive ratings. A halo effect means that the teachers may have been influenced by one very positive attribute of the student. This influence may have caused the teachers to rate other items or scales more positively than deserved. This is particularly likely to occur when teachers rate a high

achieving student positively on adjustment/ temperament scales, or when teachers tend to rate quiet, compliant children higher on their achievement. The horn effect is the influence of one very negative attribute of the child on the teacher. This causes the teacher to rate other attributes more negatively than warranted. Recency and negative event involve the teacher either remembering the most recent interaction with a child and rating them based on that incident rather than considering their behavior or performance over time and thus their overall behavior or focusing only on a single negative incident which influences the teacher's ratings. Finally, the comparison effect can also influence the validity of the information that has been collected. Teachers may compare children's behavior and performance to other children, rather than evaluating the individual child's performance or attributes against acceptable and required skills and standards. Therefore, those forms of teacher bias could have been minimized, if data had been collected using multiple sources of information such as obtaining school records for children's academic achievement, and obtaining parent ratings of temperament scales.

Second, the findings might have been more meaningful if other information, such as a standardized measure of the cognitive abilities of the children, had been gathered for the participant children. This would have been especially important for understanding the relationship between temperament and academic achievement. Previous research has found that cognitive abilities have a significant relationship with academic achievement (Deary, Strand, Smith, & Fernandes, 2007; Neisser et al., 1996). Thus, controlling for IQ in partial correlations to aid in understanding the relationship between temperament and academic achievement could allow more precise information. This would have been especially important because researchers in the area of temperament have emphasized the role of temperament in achievement beyond IQ (Blair, 2002; Keogh, 2003). Therefore, information about the children's cognitive abilities could

have allowed for partial correlations that controlled for IQ and examined the relationship between temperament and achievement. In addition, the findings of this study have shown significant relationship between persistence and achievement and this relationship differed significantly between children without identified disabilities compared with children with disabilities. However, a lack of information about the children's IQ did not allow for any conclusions to be made in this area.

Third, the sample size of this study was small, which can lead to underestimates or can affect the significance in some situations. For example, only 27 children had identified disabilities. This small sample size may explain the absence of significant differences between the children with disabilities and the children with no known disabilities. Fourth, the design of this study was a non-experimental, correlational design. Thus, the findings of this study will need to be interpreted with caution; in particular, they cannot be used to draw causal inferences. Finally, the findings of this study can only be generalized to samples that share similar characteristics with the sample in this study, that is, studies that are comprised of children at-risk for school and behavior problems in which the majority of the participant children are African Americans living in urban areas of the United States.

Implications for Practice

The results of this research provide additional support for the study of children's individual differences in temperament in children at-risk, including those with family poverty, low income, and/or disabilities. The results of this study indicated that certain temperament traits can have a positive or a negative associations with children's educational outcomes. For educational practitioners, therefore, a knowledge of children's temperament is essential for the three following reasons. First, practitioners must understand that children's behaviors have

biological individual differences which appear in their behavioral patterns. These behavioral patterns vary from one child to another, but even some extreme patterns may be considered to be within the normal range. This understanding increases awareness of the fact that not all inappropriate behaviors indicate disorders. Second, practitioners need to accept that temperament is, therefore, useful for understanding the behavioral variability in children with disabilities. Variation in temperament is characteristic of all children, including children with disabilities (Gosling et al., 2003). A child with a disorder can display a range of temperament characteristics, and no single temperament profile exists for all children with disabilities. For example, children with Down syndrome have been often stereotyped as having an easy temperament that is good natured and approaching. However, research has found that children with Down syndrome can have either a difficult or an easy temperament; they can be approaching or less approaching and high in persistence or low in persistence compared to the same or other disability categories (Bridges & Cicchetti, 1982; Radekin, 1990).

Rothbart, Ahadi, and Hershey (1994) provided a description about the ways that individual differences in temperament can affect a child's adjustment and learning in the classroom. The *same* environment will be processed differently by different children based on their temperament. For instance, some children will be more easily overwhelmed by intense levels of stimulation, such as noise or fast paced activities, than others. This feeling of discomfort during classroom instruction can influence engagement and learning. Children with positive affect, however, may become excited about upcoming positive events and engage in learning and classroom activities more than others (Rothbart & Jones, 1998). These temperament-based behaviors and interactions can form the basis for children's affective memories and evaluations of the classroom. Accordingly, children will perceive and evaluate

teacher behaviors based on their appraisal so that some children will be tuned into their teacher's cues about discipline, whereas others may fail to interpret these correctly, and as a result they may miss the point of what the teacher is saying and doing (Rothbart & Jones, 1998).

Finally, teachers' perceptions about the *teachable* child must be revised based on their understanding of their students' temperaments. Teachers tend to have certain ideas about what constitutes a teachable child. However, an understanding of the *goodness of fit* concept that undesirable behaviors, such as possessing a high level of activity or negative emotionality, can be controlled with modifications in the classroom's demands can lead to successful learning. For example, a child who is high in persistence can present difficulties for the teacher, peers, and classroom management, as this child is more likely to have difficulty switching between tasks and transitioning from one lesson to another. Such a child can easily be frustrated if he has to stop a task that he wants to complete. This child may act out as a result of his frustration or may become anxious in the classroom. Therefore, a sensitive teacher may select an activity that requires a shorter time to complete when there is a need for transitioning.

Given the fact that educational research on temperament began in the 1980s, temperament-based interventions that are evidence-based are still scarce. However, considering well established interventions such as INSIGHTS into children's temperament by McClowry and her colleagues (1998, 2008, 2010) is essential for promoting temperament-based interventions in the classroom. INSIGHTS is a comprehensive, temperament-based intervention that provides training for teachers and children on understanding and responding effectively to temperament-based behaviors by employing techniques that are known in education, such as scaffolding and stretching. McClowry, Snow, Tamis-LeMonda, Rodriguez (2010) tested the efficacy of the INSIGHTS program in comparison to a Read Aloud attention control condition in reducing

student disruptive behavior and enhancing student competence and teacher classroom management. They found that teachers trained in INSIGHTS reported significantly fewer problems managing emotional-oppositional behavior, attentional difficulties, and covert disruptive behavior. Also, teachers' perceptions of students' cognitive abilities improved significantly.

Directions for Future Research

Based on the findings from the reviewed studies and from this study, the following recommendations for future research are provided. First, children's behaviors of persistence, negative emotionality, and activity level have been shown to be critical predictors of educational success. Research has shown that a child who can listen, pay attention, follow instructions, control his or her emotions and persist on a task will usually have a high academic achievement level and tend to be well adjusted to school (McClelland et al., 2007). These positive, desirable behaviors, or the lack of them, have been examined extensively in the literature, but mainly from a pathological perspective. As described previously in this study, the four negative aspects of the dimensions of temperament (inhibition, persistence, negative emotionality, and activity level) share many of their symptoms with emotional and/or behavioral disorders. Although numerous interventions have been initiated for emotional and/or behavioral disorders, little consideration, if any, has been given to individual differences in temperament and their influences on behavioral disorders. Therefore, temperament-based assessment can be most effective if it is integrated into other educational interventions. In other words, reevaluating educational interventions in light of individual differences in temperament may be able to contribute to some of the unexplained variations in their results. For example, in the literature about academic engagement (Callicott & Park, 2003; Kern, Bambara, & Fogt, 2002; Kamps, Kravits, Stolze, & Swaggart, 1999), various

techniques, such as reinforcing positive behaviors, that is, praising the child when s/he displays an appropriate behavior, or increasing the opportunities for the child to respond (OTR) to teacher requests in a fast paced manner, have been employed to increase the level of children's engagement during classroom instruction. However, further research has indicated that the findings of these interventions were variable and that the studies did not report functional relationships (causal inferences). This variability and lack of causation may suggest that other factors, such as children's individual differences, influenced the findings (Conroy, Stichter, Daunic, & Haydon, 2008). Individual differences in temperament may be helpful in explaining the variations in the results of those interventions. For instance, the strategy of increasing the number and pace of OTR during classroom instruction may not be effective with an inhibited child; in fact, it might add another stressor for the children whom the intervention was meant to help.

The dimensions that have been used to indicate and measure temperament in this study as well as in the majority of the reviewed studies are the same indicators of problem behaviors (inhibition, low persistence, high activity level, and negative emotionality) that teachers see and deal with on an everyday basis. These similarities raise a few concerns that need to be addressed in future research. First, looking at temperament by identifying separate traits can limit the understanding of the temperament construct, which involves organized systems and includes both emotional and attentional processes (Derryberry & Rothbart, 1997) rather than separate traits that can only indicate behavior. Thus, using the developmental model explained in chapter 2 to define and measure temperament can allow for a richer view of temperament and its development (Putnam, Sanson, & Rothbart, 2002). In the developmental model, temperament is defined as constitutionally based individual differences in reactivity and self-regulation, with

constitutional referring to biological differences which are influenced by heredity, maturation, and experience. Reactivity refers to the arousability of emotional, motor, and attentional responses, as assessed by threshold, latency, intensity, time to peak intensity, and recovery time of reactions. Self regulation refers to processes such as attention that can serve to modulate reactivity (Rothbart & Derryberry, 1981). This definition defines temperament as a multidimensional construct that is not immutable and is prone to change and development. Second, research has indicated that separating temperament measures from behavior problem measures can be a problem. For example, items that are used as measures of behavior problems may become reconceptualized as measures of temperament and used in that capacity (e.g., Caspi, Henry, McGee, Moffitt, & Silva, 1995; Kendler, Sham & MacLean, 1997). Rothbart and Bates (1998) pointed out that even the best-developed measures of temperament have inadequacies. Accordingly, research needs to be directed toward developing measures with better construct validity.

Third, the usefulness and effectiveness of temperament-based interventions can raise a question about what temperament-based interventions will be able to help teachers in the classrooms that the behavioral approach has not already provided. The behavioral approach has developed numerous strategies and techniques for increasing adaptive behavior and decreasing problem behaviors in the classroom. These include reinforcing appropriate behavior, teacher praise, the good behavior game (Barrish, Saunder, & Wolf; 1969; Darveaux, 1984), direct instruction (Greenwood, 1991; Greenwood, Delquadri, & Hall, 1984; Walker, Colvin, & Ramsey, 1995), and peer tutoring (Delquadri, Greenwood, Whorton, Carta, & Hall, 1986). Since temperament-based interventions such as the INSIGHTS programs, mentioned above, emphasize recognizing and understanding the behavior as temperament-based and increasing the knowledge

of temperament for the caregivers, the question is: will understanding the cause of the problem behavior, that is, whether it is temperament-based or problem-based, make a difference in how effectively teachers respond to them? This needs to be examined using experimental designs that compare temperament-based interventions with well-established behavioral interventions that have been used effectively in the classroom. Another question that can be raised with regard to the nature of temperament-based interventions regards the ability of teachers to maintain their use of these techniques. Since these interventions focus on educating caregivers and increasing awareness of the cause of problem behavior, what is the long-term effect of such interventions? This is especially important since temperament-based interventions can have a novelty effect (McMillan, 2008), that is teachers may be motivated when they are first introduced to the topic of temperament. Thus, when they begin the applications in the classroom they may be conscious and excited about testing a new and different perspective, but this focus can fade with time. Thus, examining the long-term effect of temperament-based interventions will be necessary. Future studies should also address the role of the interaction between a child's temperament and the classroom environment as well as the ways that classrooms affect developmental changes in the structure of temperament (Gartstein & Rothbart, 2003). Specifically, future research should examine the role of the classroom environment in promoting *positive* temperament qualities which are associated with good adjustment and learning and in minimizing the effects of *negative* temperament qualities (Putnam, Sanson, & Rothbart, 2002). Such research can be done by employing observational coding systems that can capture both the children and the teacher's behaviors that are temperament-based. Evidence of change in children's temperament in response to changes in the environment is needed in order to promote the literature that focuses on temperament-based interventions (Putnam et al.).

An additional recommendation for future research stems from the fact that all the reviewed studies, as well as this current study, employed correlational research designs. Multiple research designs are needed to allow for examining other variables that may interact with children's temperament to intensify or ameliorate the educational outcomes for the children. Temperament-based assessment can direct the selection of interventions based on children's individual differences and their needs. Examining self-regulation skills interventions should be strongly considered. Research has shown that children can learn to delay their desires in situations requiring delay and to disengage their attention from the rewarding properties of the stimulus. Thus, self-regulation skills, such as the abilities that enable children to exercise effortful control and executive attention, can inhibit a dominant automatic response in order to perform a substitute planning response (Kerns, Esso, & Thompson, 1999; Kochanska, et al., 2000; Semrud-Clikeman, Nielsen, & Clinton, 1999). Finally, although the findings of this study as well as others of the reviewed studies are valuable, especially in terms of early interventions to ameliorate children's at-risk educational outcomes, yet the contribution of the temperament dimensions were small in predicting the positive educational outcomes. For instance, the findings in this current study indicated that negative emotionality accounted for 5.3% of the variance in school adjustment (log transformed adaptive skills) and persistence accounted for 9.8% of the variance in academic achievement. Thus, other factors must be able to explain the variances in academic achievement by 90.2% and in school adjustment by 94.7%. The nature of the data collected for this research did not enable the investigator to provide information on other possibly contributing variables, such as the role of classroom context, including teacher behavior (e.g., praise, reprimands), instructional strategies, and/or difficulty/ease of tasks, or on any interactions between those variables.

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Appendices

Appendix A
Participant Characteristics of Reviewed Studies

Table A
Participant Characteristics of Temperament and School Adjustment Studies

| Study | N | Age (years. months) | Gender | Ethnicity (%) | Grade | Setting | Children At-risk |
|---------------------------|------|---------------------------|-----------------------|--|--|--|--|
| Blair et al. (2004) | 153 | 3 – 4 | 80 boys 73 girls | 78% Caucasians 11.4% AfrAmrs 3% Hispanics 2.3% Asians 5.3% other | Preschool | Suburban area- US | |
| Bouffard et al. (2005) | 309 | 11.31 ^a | 135 boys 174 girls | -- | 5 th & 6 th graders | Public schools- Montreal, Canada | 55 underachievers (GPA) |
| Chen et al. (2009) | 200 | 7 | 86 boys 114 girls | NA | -- | Urban area- China | |
| Coplan et al. (2003) | 122 | 3 – 5 | 58 boys 64 girls | 83% Caucasian 5% Black 4% Hispanic 3% Asian 5% other | Preschool | Preschools & childcare centers- Ottawa, Canada | |
| Liew et al. (2004) | 78 | 3.5 – 6.4 | 38 girls 40 boys | 72% Caucasians 3% AfrAmrs 13% Hispanics 8% Asians 4% other | Preschool | university- affiliated preschools- US | |
| Nelson et al. (1999) | 75 | 8.2 – 9.10 | 25 boys 28 girls | 81% white-non- Hispanic 19% Hispanics | 3rd | Suburban- Colorado, US | |
| Prior et al. (2001) | 282 | 3 – 10 | 151 boys 131 girls | -- | -- | urban & rural areas Victoria, Australia | 186 at-risk (behavior disorders- DSM III-R) |
| Reed-Victor (2004) | 176 | 3 – 9 | 93 boys, 83 girls | 21% Caucasians 72% AfrAmrs 5% Hispanic 2% other | Preschool Kindergart en 1st – 3rd | Urban area- Virginia, US | 176 at-risk (special education/ poverty) |
| Sanson et al. (2009) | 2443 | 3 – 12 | 1269boys 1174girls | -- | -- | urban & rural areas Victoria, Australia | 186 at-risk (behavior disorders- DSM III-R) |

Note. N= total number of student participants. Dashes (--) = No information was provided. AfrAmr= African American. ^a mean age was reported. NA= not applicable.

Appendix B Characteristics of Reviewed Studies

Table B1

Temperament and School Adjustment

| Study | IV Tempera- ment Dimensions | DV Adjustment | Longitudinal Design | | Measurement | | | Results (significant relationships) | |
|---------------------------|--|---|--|----|-------------------|--|-------------------------------|---|---|
| | | | Yes | No | Temperament | | Adjustment | | |
| | | | | | Method | Measure | Method | Measure | |
| Blair et al. (2004) | Negative emotionality & effortful control | Social competence, internalizing & externalizing behaviors | Quantita- tive Non- experimen- tal Correla- tional | | Parent ratings | Children's Behavior Question- naire (CBQ; Rothbart, Ahadi, & Hershey, 1994). | Teacher ratings | Social Compe- tence and Behavior Evaluation Short Form (SCBE, LaFreniere & Dumas, 1996). | Effortful control sig. with: social competence |
| Bouffard et al. (2005) | Activity level, distrac- tibility, adaptability, emotional reactivity & rythmicity | Withdrawal, conduct problems, insecurity, perfec- tionism, self- regulation & openness | Quantita- tive Non- exper- imental Correla- tional | | Parent report | Dimen- sions of Tempera- ment survey (Lerner, Palermo, Spiro, & Nesselroa- de, 1982). | Parent & teacher report | developed & some items adopted from Achenbach (1991) | Emotional reactivity sig. with: conduct problems, perfectionism, self- regulation. Distractibility sig. with: perfectionism, conduct problems, self regulation, openness |

Table B2 (continued).

Temperament and School Adjustment

| Study | IV Temperament Dimensions | DV Adjustment | Longitudinal Design | | Measurement | | | | Results (significant relationships) |
|--------------------|---------------------------|--|---------------------|------------------|-------------|---|--|---|--|
| | | | Yes | No | Temperament | | Adjustment | | |
| | | | | | Method | Measure | Method | Measure | |
| Chen et al. (2009) | Inhibition | Social behavior, social integration, school attitudes, school related competence, learning problems, distinguish studentship | Quantitative | Non-experimental | Observation | Observational coding systems Garcia-Coll et al., 1984; Rubin et al., 1997). | Observation Self report Teacher ratings Teacher ratings School record Peer report | Social behavior coding (Chen, Wu, Chen, Wang, & Chen, 2001; Wang et al., 2006) Self-perceptions of social integration. (Harter, 1985; Cassidy & Asher, 1992). School attitudes- adapted from (Ladd, Kochenderfer, & Coleman, 1997); school-related competency, & learning problems (the Teacher-Child Rating Scale (T-CRS; Hightower et al., 1986). Distinguished studentship | Inhibition sig. with: cooperative behavior, peer liking, perceived social integration, school attitudes, teacher-rated competence, distinguished studentship, learning problems. |

Table B3 (continued).

Temperament and School Adjustment

| Study | IV Temperament Dimensions | DV Adjustment | Longitudinal Design | | Measurement | | | | Results (significant relationships) |
|----------------------|--|--|---------------------|---|--------------------------|--|--------------|---|---|
| | | | Yes | No | Temperament | | Adjustment | | |
| | | | | | Method | Measure | Method | Measure | |
| Coplan et al. (2003) | Shyness, negative affect, and activity/inattention | Internalizing, externalizing problems, & social competence | | Quantitative Non-experimental Correlational | Parents report | Colorado Child Temperament Inventory (CCTI; Buss & Plomin, 1984) | Observation | Adapted version of the Play Observation Scale (POS; Rubin, 1989). Preschool Behavior Questionnaire (PBQ; Behar & Stringfield, 1974). | Negative affect sig. with: social competence Inattention sig. with: social competence externalizing Shyness sig. with: social competence internalizing externalizing |
| Liew et al. (2004) | Negative emotionality & effortful control | Socially appropriate behaviors, popularity & externalizing behaviors | | Quantitative Non-experimental Correlational | Parent & teacher report: | Child Behavior Questionnaire (CBQ) (Goldsmith & Rothbart, 1991; Rothbart et al., 2001), Measure of intensity of negative emotionality adapted from Larsen & Diener (1987). | Peer ratings | Prosocial behaviors, popularity, & externalizing Behaviors | Effortful control/ low negative emotionality sig. with: adjustment |

Table B4 (continued).

Temperament and School Adjustment

| Study | IV Temperament Dimensions | DV Adjustment | Longitudinal Design | | Measurement | | | | Results (significant relationships) |
|----------------------|---|--|---------------------|---|----------------|---|-----------------|---|--|
| | | | Yes | No | Temperament | | Adjustment | | |
| | | | | | Method | Measure | Method | Measure | |
| Nelson et al. (1999) | Activity, adaptability, emotional intensity, & persistence. | School performance problems, positive social behaviors, externalizing problems, & internalizing problems | | Quantitative Non-experimental Correlational | Parent ratings | Temperament Assessment Battery (TAB; Martin 1988) | Teacher ratings | Behavior Assessment System for Children (BASC; Reynolds & Kamphaus, 1992) | All temperament traits sig. with all adjustment outcomes |

Table B5 (continued).

Temperament and School Adjustment

| Study | IV Tempera- ment Dimensions | DV Adjust- ment | Longitudinal Design | | Measurement | | | | Results (significant relationships) |
|------------------------|--|---|--|-------------------|--|------------------------------|--|--|--|
| | | | Yes | No | Temperament | | Adjustment | | |
| | | | | | Method | Measure | Method | Measure | |
| Prior et al. (2001) | Irritability, cooperation, reactivity. inflexibility (irritability, cooperation), persistence, rhythmicity, inflexibility, persistence, task orientation, flexibility, emotionality, shyness | Hostile- agressive, hyper- active, anxious fearful, total behavior problems, Confi- dence/ Lead- ership, empathic/ sensitive, Aggres- sion, social skills, academic compe- tence | Quantita- tive Non- exper- imental Correla- tional | Parent report | Australian adaptation of Toddler Temperament Scale (TTS) of Fullard, McDevitt, & Carey (1978, 1984), | Parent & teacher Forms | Rutter Child Behavior Question- naire (CBQ; Rutter, Tizard, & Whitmore, 1970) | Significant differences between at-risk and comparison groups in: Reactivity Irritability Cooperation Inflexibility Persistence Inflexibility Shyness | |
| | | | | Parent report | Childhood Temperament Questionnaire (CTQ; Thomas & Chess, 1977). | | | | |
| | | | | Parent report | Australian adaptation of Revised Infant Temperament Questionnaire (RITQ; Carey & McDevitt, 1978; Sanson, et al., 1987), | Self- report | adapted items from parent- reported CBQ. | | |
| | | | | Parent report | EAS Temperament Scale (Buss & Plomin, 1984). | | | | |
| | | | | Teacher report | Teacher Temperament Questionnaire (Keogh, Pullis, & Cadwell, 1982). | | | | |

Table B6 (continued).

Temperament and School Adjustment

| Study | IV Tempera- ment dimensions | DV Adjustment | Longitudinal Design | | Measurement | | | | Results (significant relationships) |
|---------------------------|---|---|--|--|---|---|--|--|---|
| | | | Yes | No | Temperament | | Adjustment | | |
| | | | | | Method | Measure | Method | Measure | |
| Reed- Victor (2004) | activity, emotional intensity, persistence, & inhibition | School performance, relationships with teachers & peers, classroom behavior | | Quantita- tive Non- experi- mental Corre- lational | Teacher ratings | Temperament Assessment Battery for Children-Revised (TABCR; Martin & Bridger, 1999) | Teacher Report | Student Adjustment Rating (adapted from Graziano & Ward, 1992) | All temperament dimensions sig. with school adjustment |
| Sanson et al. (2009) | Four temperament clusters: Nonreactive/ outgoing cluster, high attention regulation cluster, poor attention regulation cluster, and reactive/in- hibited cluster. | Behavior problems (aggression, hyperactivity, and anxiety), social skills, reading ability, and academic competence | Quan- titative Non- experi- mental Compa- rative | | Parent report- Parent report Parent report | Australian adaptation of Toddler Temperament Scale (TTS) of Fullard, McDevitt, & Carey (1978, 1984), Childhood Temperament Questionnaire (CTQ; Thomas & Chess, 1977). Australian adaptation of the Revised Infant Temperament Questionnaire (RITQ; Carey & McDevitt, 1978; Sanson, et al. (1987). | Parent & teacher Forms Self- report- | Rutter Child Behavior Question- naire (CBQ; Rutter, Tizard, & Whitmore, 1970) adapted items in parent- reported CBQ. | Reactive/inhibi- ted cluster sig. with: behavior problems social skills academic competence Poor attention regulation cluster sig. with: behavior problems social skills academic competence |

Appendix C
Participant Characteristics of Reviewed Studies

Table C
Participant Characteristics of Temperament and Academic Achievement Studies

| Study | N | Age (years. months) | Gender | Ethnicity (%) | Grade | Setting | Children At-risk |
|-------------------------------------|-----|---------------------|------------------------|----------------------------------|---------------------------------------|--|--------------------|
| Bramlett et al. (2000) | 104 | -- | -- | 98% Caucasians 2% minorities | 1 st | Rural school in a southern state-US | |
| Bruni et al. (2006) | 264 | 8 – 11 | 141 boys, 123 girls | NA | -- | Public schools in urban area, Rome | |
| Deater-Deckard et al. (2009) | 356 | 5.3 – 8.9 | -- | 92% Caucasians | 1 st , 2 nd | Metropolitan areas of Cleveland, Columbus, Cincinnati-US | |
| Guerin et al. (1994) | 109 | 10 – 13 | 60 boys 49 girls | 90% Caucasians 10% minorities | 4 th – 5 th | Public schools Fullerton, US | |
| Li et al. (2009) | 211 | 7 – 11 | 112 boys 99 girls | NA | Elementary | Taiwan | |
| Martin & Holbrook (1985) | 104 | 6.4 – 7.10 | 49 boys, 55 girls | 94% Caucasians 6% AfrAmrs | 1 st | Northern Georgia, US | |
| Martin et al. (1988) Study 1 | 117 | 5.1 – 7.1 | 65 boys 52 girls | 14% Caucasians 86% AfrAmrs | KG - 1 st | Rural south Georgia, US | |
| Martin et al. (1988) Study 2 | 22 | 3.10 – 6.6 | 14 boys 8 girls | Predominantly white | Preschool & 1 st | Preschool clinic at the University of Georgia, US | |
| Martin et al. (1988) Study 3 | 63 | -- | -- | -- | 4 th , 5 th | Northern Georgia, US | Title I |
| Maziade et al. (1986) | 39 | 12 | -- | -- | 4 th – 6 th | Canada | |
| Mevarech (1985) | 191 | -- | 94 boys 97 girls | NA | 2 nd & 4 th | Israel | |
| Newman et al. (1998) | 397 | -- | 186 boys 211 girls | Predominantly white | KG, 1 st & 3 rd | Suburban area in Albany, New York-US | Poor readers (GPA) |

Note. N= total number of student participants. Dashes (--) = No information was provided. AfrAmr= African American. NA= not applicable.

Appendix D Characteristics of Reviewed Studies

Table D1

Temperament and Academic Achievement

| Study | IV Tempera- ment Dimensions | DV Achieve- ment | Longitudinal Design | | Measurement | | | | Results (significant relationships) |
|------------------------|--|--|--|----|--------------------------------|---|------------------------------|---|--|
| | | | Yes | No | Temperament | | Achievement | | |
| | | | | | Method | Measure | Method | Measure | |
| Bramlett et al. (2000) | Activity Adaptability Persistence Emotional intensity Distractibi- lity Approach/ withdrawal | Math, reading | Quanti- tative Non- experi- mental Corre- lational | | Parent & Teacher ratings | (TAB; Martin, 1988) | Standard- ized measure | Woodcock- Johanson Psycho- educational Battery (WJ-R) (Reading, math- Woodcock & Johnson, 1990) | Academic achievement sig. with: Persistence Approach Activity |
| Bruni et al. (2006) | Activity Distract- ibility Persistence Intensity Adaptability Approach/ withdrawal Mood threshold | Reading ability Reading compre- hension Math Execu- tive ability Interest Atten- tion | Quantitative Non-experi- mental Correlational | | Teacher report | Teacher Tempera- ment Question- naire-TTQ; Thomas & Chess, 1977) | Teacher ratings | School Achieve- ment index (SAI) | Academic achievement sig. with: Activity level Distractibility Persistence Adaptability Approach |

Table D2 (continued).

Temperament and Academic Achievement

| Study | IV Tempera- ment Dimensions | DV Achieve- ment | Longitudinal Design | | Measurement | | | | Results (significant relationships) |
|-------------------------------------|---|-----------------------------|--|----|----------------|--|------------------------------|--|---|
| | | | Yes | No | Temperament | | Achievement | | |
| | | | | | Method | Measure | Method | Measure | |
| Deater- Deckard et al. (2009) | Surgency Effortful control | Reading achieve- ment | Quanti- tative Non- exper- imental Correla- tional | | Parent ratings | Child Behavior Questionnaire- Short Form (CBQ-SF; Putnam & Rothbart, 2006). | Standard- ized measure | Woodcock Reading Mastery Test (WRMT-R; woodcock, 1987). | Academic achievement sig. with: Effortful control |
| Guerin et al. (1994) | Activity Predictibi- lity Approach Adaptability Intensity Persistence Distractibilit y Threshold Negative mood | Reading Math | Quantitati ve Non- experimen tal Correla- tional | | Parent ratings | Middle Childhood Temperament Questionnaire (MCTQ; Hegvik, McDevitt, & Carey, 1982) | Standard- ized measure | Woodcock- Johnson Psycho- Educational Battery (Woodcock & Johnson, 1977), & revised version (Woodcock & Johnson, 1989) | Academic achievement sig. with: Persistence Distractibility Adaptability Approach Intensity Threshold |

Table D3 (continued).

Temperament and Academic Achievement

| Study | IV Temperament Dimensions | DV Achieve- ment | Longitudinal Design | | Measurement | | | | Results (significant relationships) |
|--------------------------------|--|------------------------|--|----|--------------------|--|---|---|---|
| | | | Yes | No | Temperament | | Achievement | | |
| | | | | | Method | Measure | Method | Measure | |
| Li et al. (2009) | Adaptability, Activity Approach/ withdrawal Emotional intensity Persistence Distractibility | Science | Quanti- tative Non- exper- imental, repeated measure | | Teacher ratings | Temperament Assessment Battery for Children (TABC; Martin, 1988) | Teacher ratings scores based on six achieve- ment tests | Science achievement | Academic achievement sig. with: Persistence Distractibility |
| Martin & Holbrook (1985) | Activity Adaptability Persistence Emotional intensity Distractibility Approach/ withdrawal | Reading Math | Quanti- tative Non- exper- imental Correla- tional | | Teacher ratings | Temperament Assessment Battery (TAB; Martin, 1984) | Teacher assigned grades | American School Achievement Test- R, (ASAT-R) | Academic achievement sig. with: Activity level Distractibility Persistence Adaptability Emotional intensity |

Table D4 (continued).

Temperament and Academic Achievement

| Study | IV Tempera- ment Dimensions | DV Achievement | Longitudinal Design | | Measurement | | | | Results (significant relationships) |
|--|--|---|--|----|--------------------|---|---|---|---|
| | | | Yes | No | Temperament | | Achievement | | |
| | | | | | Method | Measure | Method | Measure | |
| Martin et al. (1988) Study 1 | Activity Adaptability Persistence Emotional intensity Distract- ibility Approach/ withdrawal | Reading comprehension, Vocabulary Math concepts, math compu- tation, Spelling, Listening comprehension, Speaking, Writing, Reading | Quanti- tative Non- experim ental Correlati -onal | | Teacher ratings | Temperament Assessment Battery (TAB; Martin, 1984) | Teacher assigned grades Standardized Standardized | Grades Stanford Achievement Test (SAT; Passow, 1975; Lehman, 1975) The Georgia Criterion Referenced Test (CRT; Georgia State Department of Education, 1980) | Academic achievement sig. with: Activity level Persistence Distractibility Adaptability Approach Emotional intensity |
| Martin et al. (1988) Study 2 | Activity Adaptability Persistence Emotional intensity Distrac- tibility Approach/ withdrawal | Reading recognition & comprehension, Spelling, Math | Quanti- tative Non- exper- imental Correlati- onal | | Teacher ratings | Temperament Assessment Battery (TAB; Martin, 1984) | Standardized | Peabody Individual Achievement Test (PIAT; Dunn & Markwardt, 1970) | Academic achievement sig. with: Persistence Distractibility Activity Approach Emotional inten- sity |

Table D5 (continued).

Temperament and Academic Achievement

| Study | IV Tempera- ment Dimensions | DV Achieve- ment | Longitudinal Design | | Measurement | | | | Results (significant relationships) |
|-----------------------|---|----------------------------|--|----|--------------------|---|-------------------------------|--|--|
| | | | Yes | No | Temperament | | Achievement | | |
| | | | | | Method | Measure | Method | Measure | |
| Martin et al. (1988) | Activity Adaptability Persistence | Reading Math | Quanti- tative Non- exper- imental Correla- tional | | Teacher ratings | Temperament Assessment Battery (TAB; Martin, 1984) | Teacher assigned grades | Children's grades | Academic achievement sig. with: Activity level Distractibility Persistence |
| Study 3 | Emotional Distrac- tibility Approach/ withdrawal | | | | | | Standar- dized | Metropolitan Achievement Test (MAT; Gronlund, 1978) | |
| Maziade et al. (1986) | Adaptability, Activity Approach/ withdrawal Intensity Distrac- tibility Mood | Reading Writing Math | Quanti- tative Non- exper- imental Compara- tive | | Parent ratings | Middle Childhood Temperament Questionnaire (MCTQ) (Hegvik et al., 1982) | School records | Children's grades | Academic achievement sig. with: Activity level Persistence |
| | | | | | Parent ratings | Temperament Questionnaire (PTQ; Thomas, & Chess, 1977). | | | |

Table D6 (continued).

Temperament and Academic Achievement

| Study | IV Temperament Dimensions | DV Achieve- ment | Longitudinal Design | | Measurement | | | | Results (significant relationships) |
|-------------------------|--|------------------------|--|--|---|--|--|--|--|
| | | | Yes | No | Temperament | | Achievement | | |
| | | | | | Method | Measure | Method | Measure | |
| Mevarech (1985) | Activity Distractibility Persistence Intensity Adaptability Approach/ withdrawal Positive mood Threshold | Math | | Quanti- tative Non- exper- imental Correla- tional | Teacher ratings | Shortened Teacher Tempera- ment Question- naire (STTQ; Thomas, Chess, 1977) | Standardized Teacher ratings | Israeli Board of Education Arithmetic Achievement Test (AAT) Achievement | Academic achievement sig. with: Activity level Distractibility Persistence Reactivity |
| Newman et al. (1998) | Activity Persistence Adaptability Negative emotionality Inhibition | Reading | Quanti- tative Non- exper- imental Correla- tional | Parent ratings | Tempera- ment Assessment Battery for Children (TABC; Martin, 1988) | Standardized Teacher ratings | Woodcock Reading Mastery Test- Revised (WRMT-R; Woodcock, 1987) Reading | Academic achievement sig. with: Activity level Persistence Negative emotionality | |

School Performance Rating Scale

Please circle the number that best represents the student's performance in

| | Failing | Below average | Average | Above average |
|-----------------------------|---------|---------------|---------|---------------|
| a. Reading or Language Arts | 1 | 2 | 3 | 4 |
| b. Social Studies | 1 | 2 | 3 | 4 |
| c. Math | 1 | 2 | 3 | 4 |
| d. Science | 1 | 2 | 3 | 4 |

TEMPERAMENT ASSESSMENT BATTERY FOR CHILDREN — REVISED

Teacher Form

This questionnaire is designed to gather information about the way children behave in the classroom or in a preschool setting. Each statement asks you to judge whether that behavior occurs "hardly ever, infrequently, once in a while, sometimes, often very often or almost always". Please circle the number "1" if the behavior hardly ever occurs, the number "2" if it occurs infrequently, etc. Try to make this judgment to the best of your ability. Please make these judgments based on your child's behavior during the last three months.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|--|-------------|--------------|-----------------|-----------|-------|------------|---------------|
| | hardly ever | infrequently | once in a while | sometimes | often | very often | almost always |
| 1. Child seems to have difficulty sitting still. | | | | | | | 1 2 3 4 5 6 7 |
| 2. Child is shy with adults he/she does not know. | | | | | | | 1 2 3 4 5 6 7 |
| 3. If child's activity is interrupted, he/she tries to go back to it. | | | | | | | 1 2 3 4 5 6 7 |
| 4. If another child has a toy he/she wants, this child will easily accept a substitute. | | | | | | | 1 2 3 4 5 6 7 |
| 5. When telling a story, such as what happened on the weekend or during a vacation, the child talks about it loudly, with enthusiasm and excitement. | | | | | | | 1 2 3 4 5 6 7 |
| 6. Child is easily drawn away from his/her work by noises in classroom. | | | | | | | 1 2 3 4 5 6 7 |
| 7. Child will initially avoid new games and activities. | | | | | | | 1 2 3 4 5 6 7 |
| 8. Child gets upset by things that don't bother most other children. | | | | | | | 1 2 3 4 5 6 7 |
| 9. Child lets other children know when he/she does not like something by yelling and fighting. | | | | | | | 1 2 3 4 5 6 7 |
| 10. Child is able to sit quietly for a reasonable amount of time. | | | | | | | 1 2 3 4 5 6 7 |
| 11. During free play, child will stick to any activity for only a short time. | | | | | | | 1 2 3 4 5 6 7 |

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| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|-------------|--------------|-----------------|-----------|-------|------------|---------------|
| | hardly ever | infrequently | once in a while | sometimes | often | very often | almost always |
| 12. Child's attention to teacher reading stories is shorter than other children. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 13. Child takes a long time to become comfortable in a new situation. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 14. Child plunges into new activities without hesitation. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 15. Child can continue the same activity for an hour. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 16. It is difficult to tell what this child is feeling. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 17. Child will perform before the class with no hesitation. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 18. When child loses a game, he/she takes it lightly. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 19. If another child is talking or making a noise while teacher is explaining a lesson, this child remains attentive to the teacher.. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 20. Child is bashful when meeting new children. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 21. Child starts an activity and does not finish it. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 22. When behavior is corrected by the teacher, this child gets angry or upset. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 23. This child is easily sidetracked. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 24. Child overreacts in a stressful situation. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 25. Child's movements are slow. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 26. Child gets upset with other children. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 27. During free play time, child prefers quiet activities. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 28. Child sits still when a story is being told or read. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 29. Child seems angry or moody. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Thank You

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Vita

Maha Al-Hendawi was born on January 2, 1971, in Doha, Qatar. She received her Bachelor of Arts in Education from Qatar University in 1992 and subsequently taught in the public schools in Qatar for four years. Dr. Al-Hendawi received a Masters of Arts in Counseling from the University of San Francisco, California, in 2001 and subsequently worked as a counselor and then a consultant for five years. Dr. Al-Hendawi joined Qatar University in 2005 as an instructor in the Department of Psychological Sciences. She was awarded the degree of Doctor of Philosophy from Virginia Commonwealth University, Richmond, Virginia, in 2010.

