

EDUCATIONAL OUTCOMES FOR CHILDREN AT-RISK: THE INFLUENCE OF INDIVIDUAL DIFFERENCES IN CHILDREN'S TEMPERAMENTS**Maha Al-Hendawi***Qatar University***Evelyn Reed***Virginia Commonwealth University*

Individual differences in temperament can be protective or risk factors that may enhance or interfere with children's healthy development and educational success. This study examined the concurrent and predictive relationships between temperament, school adjustment, and academic achievement in children at-risk. Seventy-seven children at-risk, ages five to 11 years, were assessed in this study. The results for the concurrent relationships showed significant relationships between 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. Implications for practice and considerations for future research directions are discussed.

Introduction

Educational research into the role of children's temperaments began in the 1980s. In particular, academic achievement and school adjustment were among the first variables to be examined in educational settings. The significance of understanding a child's temperament as it relates to school can be explained by the concept of *goodness of fit* (Thomas & Chess, 1977). That is, a school's environment must be compatible with a child's temperament for the child to have optimal development, healthy adjustment, and positive educational outcomes. The environment should work with, not against, the child's temperament (Kristal, 2005). Children's individual differences in temperament as well as their teachers' effectiveness in promoting goodness of fit between children's needs and classroom environments are factors that can influence the children's adjustment as well as their learning and academic achievement (Keogh, 2003; Martin & Bridger, 1999).

Definition of temperament. Several theories about child temperament have emerged and have shaped models of temperament that define it and identify its traits. There is no consensus about a definition of the term *temperament* and its traits, but almost all models include several constructs, 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 by behavioral tendencies rather than by discrete behavioral acts (Goldsmith et al., 1987). The clinical model by Thomas and Chess (1977) and the developmental model by Rothbart and Derryberry (1981) are the ones most widely used in educational research (Zentner & Bates, 2008). In the clinical model, temperament is defined as biologically based, individual differences in the behavioral tendencies of an individual that indicate the person's pattern of responding to others and to situations in the environment. In children, temperament refers to the behavioral style or tendencies that affect *how* a child responds to a situation. It is not so much a matter of *why* or *what*, in that *why* refers to the motivation behind an action and *what* involves the ability of a person to perform a task (Thomas & Chess, 1977). In this model, three typologies were developed to describe the temperament of a child: 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. The developmental model of temperament, however, focuses on emotion and emotion regulation; a strong emphasis is placed on attentional and neurobiological mechanisms (Zentner & Bates, 2008). Temperament, in the developmental 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 (Rothbart & Derryberry, 1981).

Multiple dimensions of temperament comprise each model. Dimensions of temperament are clustered and measured differently by researchers and have also been used differently depending on what was appropriate for the specific developmental level of the children. However, while definitions differ across models of temperament, most of the temperament dimensions exist across the models but were labeled differently. For instance, reactivity in the clinical model can be referred to as negative emotionality in the developmental model (Nelson, Martin, Hodge, Havill, & Kamphus 1999; Sanson et al., 2009).

Temperament Studies in North America (US and Canada)

Research in North America has demonstrated that a child's temperament influences their 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). A child who is inhibited is often underestimated academically, whereas a child's greater task orientation often influences his/her teacher to assign higher grades (Martin, Drew, Gaddis, & Moseley, 1988). Teachers' behaviors towards children with different temperament profiles tend to differ systematically. For instance, teachers have been found to use task orientation information across classroom management decision-making situations; that is, children with a higher level of task orientation were less monitored for inappropriate or disruptive behaviors than were children with a low level of task orientation (Pullis & Cadwell, 1982). Children's temperaments significantly correlated with the amount of time that teachers spend with children, in particular with the frequency of teachers' praise and criticism, physical contact, and directive behaviors (Nelson, 1987).

Temperament and school adjustment. Previous studies have examined the relationship between children's temperaments and school adjustment (Blair, Denham, Kochanoff, & Whipple, 2004; Coplan, Bowker, & Cooper, 2003). School adjustment was indicated by school competence, social competence, and/or internalizing and externalizing behavior problems. Nelson et al. (1999) found that negative emotionality in parent-rated temperament of five year old children was a predictor of third grade teacher-rated adjustment difficulties. Their results showed that negative emotionality predicted all four adjustment outcome measures: school performance problems, internalizing problems, positive social behaviors, and externalizing problems, the last of which had the strongest relationship with negative emotionality in that it accounted for 16.6% of the variance in teacher rated externalizing problems. Similar findings that negative emotionality is a dimension of temperament that fundamentally influences school adjustment have been reported (Bouffard, Roy, & Vezeau, 2005; Coplan et al., 2003; Reed-Victor, 2004). 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 which influenced the children's adjustment to school. Research has found that correlations based on parent reports of their children's temperaments were stronger than those from teachers. Bouffard et al. (2005) compared the relationship between children's temperaments and school adjustment, as evaluated by parents and teachers. Significant correlations between parent-rated adjustment and teacher-rated adjustment were found in all dimensions of temperament, and all pairs of relationships were in the same direction. That is, they were alike in being either positive or negative, but the correlations that were based on parent reports were stronger than those from teachers.

Temperament and academic achievement. Research has examined the relationship between children's temperaments and academic achievement by assessing children's performance on subject matter (e.g., reading, math, writing, and science) using two methods: standardized achievement tests and/or teacher

rated achievement (Bramlett, Scott, & Rowell, 2000; Martin et al., 1988). Keogh, Pullis, and Cadwell (1982) categorized the dimensions of temperament into the three categories, which they considered to be the most significant for academic success: task orientation, personal-social flexibility, and reactivity. Task orientation includes the following dimensions: activity level, distractibility, and persistence; personal-social flexibility includes adaptability, approach/withdrawal, and positive mood; and reactivity is comprised of three dimensions of temperament: intensity, threshold, and negative mood. Task orientation has consistently been shown to have the most significant relationship with academic achievement in studies that utilized the clinical model. For example, Martin and Holbrook (1985) examined 104 first graders using both teachers' ratings achievement and standardized measures of reading and math and found that the teachers' ratings of activity level and persistence were significant predictors of reading and math achievement. Subsequent studies have found similarly significant relationships between task orientation and academic achievement (Bramlett et al., 2000; Guerin, Gottfried, Oliver, & Thomas, 1994; Newman, Noel, Chen, & Matsopoulos, 1998).

Studies that utilized the developmental model of temperament reported temperament dimension of effortful control as having the most significant relationship with academic achievement (Deater-Deckard, Mullineaux, Petrill, & Thompson, 2009). Both standardized achievement tests and teacher rated achievement have been 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 (Bramlett et al., 2000; Guerin et al., 1994; Martin et al., 1988; Martin & Holbrook, 1985). This difference in the strength of the relationships may be due to the nature of each test, in that standardized tests tend to be objective measures of achievement, whereas teacher rated achievement tends to be a subjective measure. However, teacher ratings of temperament have been found to be better predictors of achievement as measured by either assigned grades or standardized tests than have parent ratings (Bramlett et al., 2000; Neman et al., 1998; Martin & Holbrook, 1985; Martin et al., 1988) because teachers' 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 (Newman et al., 1998). Environmental context may influence the strength of such correlations; different temperament characteristics tend to be salient in the home, whereas others are likely to be salient in the school setting. For example, task persistence 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. Similarly, task orientation temperament traits may not be as disturbing or as noticeable in the home as they are in the classroom in which structured activity and specific rules are in place (Bramlett et al. 2000; Keogh et al., 1982; Liew, Eisenberg, & Reiser, 2004).

Temperament Studies in the International Literature

Research in other regions of the world, including Europe, the Middle East, and Asia, has also examined the relationships between temperament and academic achievement, and temperament and school adjustment. For example, Bruni et al. (2006) investigated the relationship between temperament and academic achievement for 264 children, aged eight to 11, in urban areas of Rome. This research found that the temperament dimension of task orientation strongly correlated with school achievement index (SAI) and that personal-social flexibility moderately correlated with school achievement. They reported that these two dimensions of temperament accounted for about 51% of the total variance, making them the most predictive factors for SAI. Reactivity was found to have a weak negative correlation with the SAI. Bruni et al.'s findings are in line with the findings reported in the North American studies discussed above. Similar findings were found in two other international studies (Taiwan and Israel). Li, Onaga, Shen, and Chiou (2009) examined 211 Taiwanese elementary level children. Their findings indicated a significant relationship between science achievement and both persistence and distractibility. Mevarech (1985) investigated 191 second and fourth grade Israeli children. Their findings showed significant relationships with math achievement for all the temperament dimensions that they examined. However, Mevarech found that correlations between teachers' rating of achievement and task oriented behavioral style (adaptability, persistence, distractibility, and threshold) were higher for second graders than for fourth graders. Another interesting study by Chen, Chen, Li, and Wang (2009) examined the relationship between temperament and school adjustment for 200 seven year old children in urban areas of China. They found the temperament dimension of inhibition correlated significantly with school adjustment, but in a way that was very different from what is typically found in Western children. Chen et al. used an observational method to obtain data on inhibition as a temperament dimension while employing teacher and peer reports about school adjustment. Inhibition was positively associated with later cooperative behavior, peer liking, perceived social integration, school attitudes, teacher-rated competence, and distinguished studentship. Inhibition was also negatively associated with later teacher-

rated learning problems. This pattern of relationship between inhibition and later adjustment outcomes in Chinese children, which was different from those typically found in Western children, conveys the role of culture and environmental context. Specifically, inhibition is perceived as a positive aspect of temperament that Chinese children are encouraged to have.

Gender Differences in Temperament

Very few studies have reported gender differences in temperament. In a couple that did, girls were higher than boys in one dimension of temperament, effortful control (Liew et al., 2004). Other studies found no significant differences in gender (Blair et al., 2004; Bouffard et al., 2005); gender differences, when they were found to exist, were differences in strength rather than in the nature of the effects (Prior, Smart, Sanson, & Oberklaid, 2001). 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 first grade. Deater-Deckard et al., (2009) examined the influence of children's gender on the investigated variables. Only two notable findings were reported for gender differences, that is, girls were higher than boys in effortful control, and lower than boys in surgency, which indicates high-energy activation and includes impulsivity, high intensity pleasure, activity level, and low levels of shyness.

However, existing research that investigated the relationship between temperament, school adjustment, and academic achievement, whether from studies developed in North America or internationally, has primarily examined predominantly middle class children who were basically developing typically (Bramlett et al., 2000; Nelson et al., 1999). Very few studies have examined children at-risk, those of low income families, minorities, and/or children with disabilities (Prior et al., 2001). The number of children at-risk is high in the US and is increasing; approximately one-third of the children in the US are at risk for school failure before they even enter kindergarten (Lerner, Lowenthal, & Egan, 2003). Children at-risk are likely to have single or multiple risk factors, which can cause serious problems early in life. Sources of early risk in children's lives can be classified into three categories: biological, familial, and environmental (Edwards, Mumford, & Serra-Roldan 2007; Werner, 2000). Thus, individual differences in temperament can present potential risks or protective factors for healthy development. Certain temperament profiles can be *difficult temperaments* which can predict adjustment problems, low achievement, and difficulties for individuals in later life (Thomas & Chess, 1977). For example, temperament dimensions such as high activity level, negative emotionality, and impulsivity can add an additional stressor to at-risk children. However, a child with a difficult temperament can adjust to the demands of the environment with appropriate support. If the classroom environment can be made to be compatible with the child's temperament, the child can be well adjusted and, therefore, academically and behaviorally competent and more likely to succeed. Therefore, identifying children's temperaments' profile at an early age so that appropriate modifications of the classroom environment can occur is necessary. International data have also indicated that children at-risk exist in all parts of the world and that these children almost always encounter obstacles to adequate educational opportunity. For instance, in many Middle Eastern and African countries children at-risk may be denied opportunities to learn or may be provided with low equality education and exposed to social stigmas (UNESCO, 2010). In Germany and England children at-risk are usually from immigrant backgrounds and/or have a low socioeconomic status (Dyson & Gallannaugh, 2008; Werning, Löser, & Urban, 2008).

This research examined temperament in children at-risk, who were primarily African Americans with low income/poverty and/or disability. The purpose of this study was to identify individual differences in temperament and assess their relationship to positive school outcomes for children at-risk. Specifically, we examined children's temperament traits that are associated with and predict school adjustment and academic achievement for children at-risk. Three research questions were investigated to determine the concurrent and predictive relationships between children's temperament, school adjustment, and academic achievement for children at-risk. The research questions were as follows: 1. What is the relationship between the four dimensions of temperament (inhibition, persistence, negative emotionality, and activity level), school adjustment, and academic achievement among children at-risk? 2. To what extent do these four dimensions of temperament explain variations in concurrent school adjustment and academic achievement among children at-risk? 3. Do temperament differences exist between boys and girls with regards to academic achievement and school adjustment?

Method

Participants

The participants in this study were 77 children who were eligible for Title I, special education, and/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 included 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.

The children were identified as being at risk based on school system data that included their eligibility for specific educational programs, i.e., Title 1 (based on low family income), Special Education (based on identified disabilities), and/or Homeless Education (based on instability of family housing). Risk group eligibility was determined based on categorical risk related programs as identified by Virginia Department of Education regulations and local education agencies' policies.

Measures

The Temperament Assessment Battery for Children -Revised (TABC-R; Martin & Bridger, 1999). The TABC-R was designed to assess four temperament traits of children and contains both parent and teacher forms. The current study used the teacher form of the TABC-R, which includes 29 items describing behaviors reflective of four dimensions of temperament: 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).

The Likert-type ratings that were used are based on the frequency of behaviors for individual children (1 = 'hardly ever' through 7 = 'almost always'). The items that were used represent bipolar aspects of temperament dimensions (e.g., high and low activity levels). Temperament dimension raw scores were calculated for the students based on the factor analyses and scoring procedures outlined in the most recent TABC-R manual (Martin & Bridger, 1999).

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. 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's age from six to eleven was used. The adaptive skills scales used four indicators (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). High scores on those scales indicate positive or desirable behaviors. Teachers were 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).

Academic achievement measure. Data on children's academic achievement was 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 each 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. *Academic Achievement* is defined as the academic performance of students in specific subject matters (reading or language arts, math, science, and social studies).

Procedures

With the approval of school administrators, the current teachers of these children were asked to participate in this study. Of those contacted, 72 teachers agreed to participate by completing the TABC-R 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 to three week period. 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 to have sufficient interactions with them in order for the teachers to be able to provide credible information about the children's temperaments and their academic and social behaviors.

Design

This study employed a non-experimental correlational design to examine the concurrent and predictive relationships between four dimensions of temperament (inhibition, persistence, negative emotionality, and activity level), and two educational outcomes (school adjustment and academic achievement). Two statistical analyses were used to address the research questions: bivariate correlations and multiple regressions.

Results

Table 1 presents the means and standard deviations for the predictive variables. For the outcome variables, the academic achievement scores of the participants ranged from 4 to 16 ($M = 10.18$, $SD = 3.14$) indicating an average achievement across all subjects of a below average grade. The adaptive skills ranged from 43 to 148 ($M = 80.62$, $SD = 23.43$) indicating that the children had inadequate skills on adaptability, study skills, social skills, and leadership skills. Both means indicate low adaptive skills and low levels of academic achievement. These results were expected as at-risk children have been shown to have adjustment difficulties and achievement problems (Hamre & Pianta, 2005; Edwards et al., 2007). Additionally, means and standard deviations were obtained by gender for the examined variables. Only activity level was found to be higher in boys than in girls ($M = 17.98$, $SD = 4.06$) and ($M = 15.80$, $SD = 4.58$), respectively. All other temperament dimensions showed no significant differences between the girls and boys.

Table 1. Means and Standard Deviations of the TABC scale

TABC 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. $N = 77$.

Table 2 shows that negative emotionality had a significant correlation with adaptive skills ($r = -.23$, $p < .05$). When correlations were performed by gender, adaptive skills significantly correlated for girls with negative emotionality, persistence, and activity level. No significant correlations were found for boys.

Table 2. Correlations between TABC Scale and the Adaptive Skills for the Total Sample and by Gender

TABC Scale		Inhibition	Negative Emotionality	Persistence	Activity Level
Adaptive Skills	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 3 shows that persistence ($r = .31, p < .01$) and activity level ($r = -.27, p < .05$) were found to have significant relationships with academic achievement. Three significant correlations were found for girls: negative emotionality, persistence, and activity level ($r = .39, .42, ps < .05$) and ($r = -.62, p < .01$), respectively.

Table 3. Correlation Coefficients between TABC Scale and Academic Achievement for the Total Sample and by Gender

TABC Scale		Achievement	Inhibition	Negative Emotionality	Persistence	Activity Level
Achievement	Total	-.10	-.12		.31**	-.27*
Boys		.06	.13		.19	.08
Girls		-.30	-.39*		.42*	-.62**

Note. N = 77 (Boys = 39; Girls = 33).

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

Two stepwise multiple regression analyses were performed to examine the predictive relationships. The first was for the academic achievement score against the four temperament dimension scores, and the second was for the adaptive skills against the four temperament dimensions. 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. The results indicated the presence of linear relationships between the variables and detected no multicollinearity problems.

Table 4 shows that persistence was the only predictor which entered the first regression model for academic achievement against the four temperament dimensions; it had a statistically significant direct influence on academic achievement, accounting for 9.8% of the variance ($R^2 = .098$, adjusted $R^2 = .085$, $p < .01$). The remaining variables (inhibition, negative emotionality, and activity level) failed to significantly predict academic achievement.

Table 4. Stepwise Multiple Regression for TABC Scale Predicting Academic Achievement

TABC Scale	B	Standard Error of B	β
Persistence	2.95	1.07	.314

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

Table 5 shows that negative emotionality was the only predictor which entered the regression model in the second stepwise regression in which adaptive skills were regressed against the four temperament

variables; it had a statistically significant direct influence on the adaptive skills scale, accounting for 5.3% of the variance ($R^2 = .053$, adjusted $R^2 = .040$, $p < .05$).

Table 5. Stepwise Multiple Regression for TABC Scale Predicting School Adjustment

TABC Scale	B	Standard Error of B	β
Negative Emotionality	-.006	.003	-.230

Note. $N = 77$, $R^2 = .053$, adjusted $R^2 = .040$, $p < .05$.

Discussion

The aim of this study was to investigate the concurrent and predictive relationships between temperament, school adjustment, and academic achievement. In this study, we examined children from low income families, minorities, and/or children with disabilities; the majority of the participants were African Americans. Three major findings were consistent with previous research, which has primarily examined middle class children (Blair et al., 2004; Liew et al., 2004; Martin et al., 1988). First, significant relationships were found for both areas of interest, school adjustment and academic achievement, in relation to children's temperament. Second, the magnitude of the relationships primarily fell within a weak to moderate range. Third, negative emotionality and persistence were found to be the most significant and predictive variables for school adjustment and academic achievement, respectively.

Temperament and School Adjustment

Temperament was found to have a significant association with school adjustment. Specifically, negative emotionality had a significant negative correlation ($r = -.23$, $p < .05$) with school adjustment. This level of correlation is considered weak. The findings of this study are in line with previous research (Blair et al., 2004; Liew et al., 2004). This finding of the influence of negative emotionality on school adjustment is expected because a child with negative emotionality can present a challenge in social situations such as the classroom. According to Martin and Bridger (1999), negative emotionality is the most single predictive temperament trait for negative social outcomes and is often associated with externalizing and internalizing behaviors. Children with this temperament are more likely to exhibit inappropriate behaviors and have difficulty regulating their emotions in ways that would allow them to adhere to the demands of the classroom environment. Such classroom demands often require some level of regulation of emotion and the ability to delay the fulfillment of individual desires, both of which may be difficult for children with higher 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 found in previous research (Bramlett et al., 2000; Li et al., 2009; Martin et al., 1988; Martin & Holbrook, 1985). Significant associations were found between temperament and academic achievement. Specifically, persistence and activity level were significantly correlated with academic achievement at $r = .31$, $p < .01$ and $r = -.27$, $p < .05$, respectively, yet both correlations are considered weak. Persistence was found to be the only predictor of academic achievement, accounting for 9.8% of the variance ($R^2 = .098$, adjusted $R^2 = .085$, $p < .01$). 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 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). Children at-risk who can self-regulate their emotions and behaviors have higher scores in reading, math and vocabulary (McClelland et al., 2007).

Temperament and gender. Differences based on gender were found in this study, as described in the results section. Gender differences have been found across countries and cultures, with boys rated with higher levels of activity, impulsivity, emotional intensity, and lower levels of shyness (Blair et al., 2004; Nelson et al., 1999; Prior et al., 2001; Whiting & Edwards, 1988). 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. Girls are rated higher in effortful control skills than boys as well as

higher in social competence and adjustment (Liew et al., 2004). Girls have also been rated higher in 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.

Implications for Practice

This study investigates research into children's individual differences in temperament, specifically for children at-risk, including those with family poverty, low income, and/or disabilities. Our results indicate that certain temperament traits can have a positive or a negative association with children's educational outcomes. For educational practitioners, therefore, a knowledge of a child's temperament is essential. Practitioners must understand that children's behaviors have biologically-based, 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. Practitioners also need to understand that variations in temperament are characteristic of children, including those 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. Practitioners' awareness of individual differences in children's temperament may help them understand that the *same* environment will be experienced differently by children based on their individual differences in temperament characteristics (Rothbart, Ahadi, & Hershey, 1994). For example, some children will be more easily overwhelmed by intense levels of stimulation, such as noise or fast paced activities, than others. The resulting feeling of discomfort during classroom instruction can influence engagement and learning. Children with a positive affect, however, may become excited about upcoming positive events and engage in learning and classroom activities more than children with other temperament dimensions (Rothbart & Jones, 1998). Temperament-based behaviors and interactions can also form the basis for children's affective memories and evaluations of the classroom. Accordingly, children will perceive and evaluate teacher behaviors based on their own personal 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 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 behavior, such as possessing a high level of activity or negative emotionality, can be controlled with modifications in the classroom's demands and can lead to successful learning. 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. In this way, knowledge of the influence that a child's temperament may bring into the classroom should be embedded in teacher education and preparation programs.

Directions for Future Research

Recommendation for future research stem from the fact that this study, as well as previous studies, employed a correlational research design. The findings of this type of study are descriptive in nature; they do not report functional relationships and only allow causal inferences. Therefore multiple research designs are needed, especially ones that examine 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 any interactions between those variables. Second, an attempt was made to obtain data from various information sources (parents, students, school records). However, the participating school systems restricted the researchers' access to only the children's 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. Third, identifying the profile of children's temperaments can be most effective if it is integrated into other educational interventions. That is, re-evaluating educational interventions in light of individual differences in temperament may be able to contribute to some of the unexplained variations in their results. Individual differences in temperament can direct the selection of interventions based on children's individual differences and their needs.

Information about a child's temperament profile is useful for prevention and intervention approaches that promote *goodness of fit* for each child in the classroom. Future studies should address areas such as helping the child understand his/her own responses to various experiences, and providing teachers with strategies for changing the environmental demands to more effectively accommodate children's individual differences (Reed-Victor, 2004). Future studies should also address the cultural context of children's temperament and the role of the interaction between the child and the environment. Exploring children's temperaments within various cultural contexts is essential. For example, inhibition is a temperament's dimension which has been shown in the US and western culture to have a negative influence on a child's adjustment and achievement. However, research has shown that these negative effects that inhibition may present to a western child do not necessarily apply to Chinese children (Chen et al., 2009). Inhibited Chinese children were found to have a higher level of academic achievement and a higher level of school adjustment. Examining the role of the interaction between children's temperament and the classroom environment can help in understanding factors in the classroom environment that can promote *positive* temperament qualities which are associated with good adjustment and learning and factors that can minimize the effects of *negative* temperament qualities (Putnam, Sanson, & Rothbart, 2002).

In conclusion, temperament can be a biological risk factor that can add additional stressors or can be a protective factor that can either increase or minimize the negative effects of other risks that a child at-risk may have. An understanding of children's temperaments is necessary if the teacher is to provide a classroom environment that is compatible with that temperament. The environment should work with, not against, the child's temperament (Kristal, 2005). If *goodness of fit* (Thomas & Chess, 1977) exists between the demands and expectations of the environment and a child's temperament, healthy development is likely to occur (Kristal, 2005). Although the findings of this study were in line with previous studies that examined children's temperaments for predominant, middle class groups, this study helps to pinpoint the particular need for temperament evaluations in at-risk children early in their school career.

References

- Blair, K. A., Denham, S. A., Kochanoff, A., & Whipple, B. (2004). Playing it cool: Temperament, emotion regulation, and social behavior in preschoolers. *Journal of School Psychology*, 42, 419-443.
- Bouffard, T., Roy, M., Vezeau, C. (2005). Self-perceptions, temperament, socioemotional adjustment and the perceptions of parental support of chronically underachieving children. *International Journal of Educational Research*, 43, 215-235.
- Bramlett, R. K., Scott, P., & Rowell, R. K. (2000). A comparison of temperament and social skills in predicting academic performance in first graders. *Special Services in the Schools*, 16, 147-158.
- Bruni, O., Ferini-Strambi, L., Russo, P. M., Antignani, M., Innocenzi, M., Ottaviano, P., Valente, D., & Ottaviano, S. (2006). Sleep disturbances and teacher ratings of school achievement and temperament in children. *Sleep Medicine*, 7, 43-48.
- Chen, X., Chen, H., Li, D., & Wang, L. (2009). Early childhood behavioral inhibition and social and school adjustment in Chinese children: A 5- year longitudinal study, *Child Development*, 80(6), 1692-1704.
- Coplan, R. J., Bowker, A., & Cooper, S. M. (2003). Parenting daily hassles, child temperament and social adjustment in preschool. *Early Childhood Research Quarterly*, 18, 376-395.
- Deater-Deckard, K., Mullineaux, P., Petrill, S. A., & Thompson, L. A. (2009). Effortful control, surgency, and reading skills in middle childhood. *Reading and Writing*, 22, 107-116.
- Dyson, A. & Gallannaugh, F. (2008). Disproportionality in special needs education in England *The Journal of Special Education*, 42, 26-46.
- Edwards, O. W., Mumford, V. E., & Serra-Roldan, R. (2007). A positive youth development model for students considered at-risk. *School Psychology International*, 28, 29-45.
- Goldsmith, H. H., Buss, A. H., Plomin, R., Rothbart, M. K., Thomas, A., Chess, S., Hinde, R., & McCall, R. (1987). Roundtable: What is temperament? Four approaches. *Child Development*, 58, 505-529.
- Guerin, D. W., Gottfried, A. W., Oliver, P. H., Thomas, C. W. (1994). Temperament and school functioning during early adolescence. *Journal of Early Adolescence*, 14, 200-225.
- Hamre, B. K., & Pianta, R. C. (2005). Can instructional and emotional support in the first grade classroom make a difference for children at risk of school failure? *Child Development*, 76, 949-967.
- Keogh, B. K. (2003). *Temperament in the classroom: Understanding individual differences*. Baltimore: MD: Paul H. Brookes.
- Keogh, B. K., Pullis, M. E. & Cadwell, J. (1982). A short form of the teacher temperament questionnaire. *Journal of Educational Measurement*, 19(4), 323-327.

- Kerns, K. A., Esso, K., & Thompson, J. (1999). Investigation of a direct intervention for improving attention in young children with ADHD. *Developmental Neuropsychology, 16*, 273-295.
- Kristal, J. (2005). *The Temperament Perspective: Working with Children's Behavioral Styles*. Baltimore: Brookes.
- Lerner, J.W., Lowenthal, B., & Egan, R.W. (2003). *Preschool children with special needs: Children at risk and children with disabilities*. (2nd ed.). Boston: Allyn and Bacon.
- Li, I., Onaga, E., Shen, P. S., & Chiou, H. H. (2009). Temperament characteristics and science achievement: A longitudinal study of elementary students in Taiwan. *International Journal of Science Education, 31*, 1175-1185.
- Liew, J., Eisenberg, N., & Reiser, M. (2004). Preschoolers' effortful control and negative emotionality, immediate reactions to disappointment, and quality of social functioning. *Journal of Experimental Child Psychology, 89*, 298-313.
- Martin, R. P., & Bridger, R. C. (1999). *The Temperament Assessment Battery for Children-Revised*. Athens: University of Georgia.
- Martin, R. P., & Holbrook, J. (1985). Relationship of temperament characteristics to the academic achievement of first grade children. *Journal of Psychoeducational Assessment, 3*, 131-140.
- Martin, R. P., Drew, D., Gaddis, L., & Moseley, M. (1988). Prediction of elementary school achievement from preschool temperament: Three studies. *School Psychology Review, 17*, 125-137.
- McClelland, M. M., Cameron, C. E., Connor, C. M., Farris, C. L., Jewkes, A. M., & Morrison, F. J. (2007). Links between behavioral regulation and preschoolers' literacy, vocabulary, and math skills. *Developmental Psychology, 43*, 947-959.
- Mevarech, Z. R. (1985). The relationships between temperament characteristics, intelligence, task-engagement and mathematics achievement. *British Journal of Educational Psychology, 55*, 156-163.
- Nelson, J. N. (1987). Child temperament, gender and teacher-child interactions: An observational study. *Early Child Development and Care, 29*, 343-365.
- Nelson, B., Martin, R. P., Hodge, S., Havill, V. & Kamphus, R. (1999) Modeling the prediction of elementary school adjustment from preschool temperament, *Personality and Individual Differences, 26*, 687-700.
- Newman, J., Noel, A., Chen, R., & Matsopoulos, A. S. (1998). Temperament, selected moderating variables and early reading achievement. *Journal of School Psychology, 36*, 215-232.
- Prior, M., Smart, D., Sanson, A., & Oberklaid, F. (2001). Longitudinal predictors of behavioural adjustment in pre-adolescent children. *Australian and New Zealand Journal of Psychiatry, 35*, 297-307.
- Pullis, M. & Cadwell, J. (1982). The influence of children's temperament characteristics on teachers' decision strategies. *American Educational Research Journal, 19*(2), 165-181.
- Reed-Victor, E. (2004). Individual differences and early school adjustment: teacher appraisals of young children with special needs. *Early Child Development and Care, 174*, 59-79.
- Reynolds, C. R., & Kamphaus, R. W. (1992). *The Behavior Assessment System for Children. Manual*. Minnesota: American Guidance Service.
- Rothbart, M. K., & Derryberry, D. (1981). Development of individual differences in temperament. In M. E. Lamb & A. L. Brown (Eds), *Advances in developmental psychology* (Vol. I, pp. 37-86). Hillsdale, N. J.: Erlbaum.
- Sanson, A. V., Letcher, P., Smart, D., Prior, M., Toumbourou, J. W., & Oberklaid, F (2009). Associations between early childhood temperament clusters and later psychosocial adjustment. *Merrill Palmer Quarterly, 55*(1), 26-54.
- Semrud-Clikeman, M., Nielsen, K. H., & Clinton, A. (1999). An intervention approach for children with teacher and parent-identified attentional difficulties. *Journal of Learning Disabilities, 32*, 581-589.
- Thomas, A., & Chess, S. (1977). *Temperament and Development*. New York: Brunner-Mazel.
- UNESCO (2010). Reaching the marginalized. Retrieved from <http://www.unesco.org/fileadmin/MULTIMEDIA/HQ/ED/GMR/pdf/gmr2010/gmr2010-ch3.pdf>
- Werner, E. E. (2000). Protective factors and individual resilience. In J. P. Shonkoff & S. J. Meisels (Eds.), *Handbook of early childhood intervention* (2nd ed., pp. 115-132). New York: Cambridge University Press.
- Werning, R., Löser, J.M. & Urban, M. (2008). Cultural and social diversity: an analysis of minority groups in German schools. *The Journal of Special Education, 42*, 47-54.
- Whiting, B. B. & Edwards, C. P. (1988). *Children of different worlds: The formation of social behavior*. Cambridge, MA: Harvard University Press. Williams Institute.
- Zentner, M. & Bates, J. E. (2008). Child Temperament: An integrative review of concepts, research programs, and measures. *European Journal of Developmental Science, 2*, 7-37.