Published in final edited form as:

Early Educ Dev. 2013 January 1; 24(6): 813–828. doi:10.1080/10409289.2013.744682.

Effortful Control, Behavior Problems and Peer Relations: What Predicts Academic Adjustment in Kindergarteners from Low-income Families?

Amanda Sheffield Morris, PhD,

Department of Human Development & Family Science, Oklahoma State University

Aesha John, PhD,

Department of History, Philosophy, and Social Sciences, Pittsburg State University

Amy L. Halliburton, PhD,

Department of Human Development and Family Science, Oklahoma State University

Michael D. S. Morris, PhD,

Department of Economics and Legal Studies, Oklahoma State University

Lara R. Robinson, PhD,

Department of Psychology, University of New Orleans

Sonya S. Myers, PhD,

Department of Psychology, University of New Orleans

Katherine J. Aucoin, PhD,

Department of Psychology, University of New Orleans

Angela W. Keyes, PhD, and

Department of Psychology, University of New Orleans

Andrew Terranova, PhD

Department of Psychology, University of New Orleans

Abstract

This study examined the role of effortful control, behavior problems, and peer relations in the academic adjustment of 74 kindergarten children from primarily low-income families using a short-term longitudinal design. Teachers completed standardized measures of children's effortful control, internalizing and externalizing problems, school readiness, and academic skills. Children participated in a sociometric interview to assess peer relations. Research Findings: Correlational analyses indicate that children's effortful control, behavior problems in school, and peer relations are associated with academic adjustment variables at the end of the school year, including school readiness, reading skills, and math skills. Results of regression analyses indicate that household income and children's effortful control primarily account for variation in children's academic adjustment. The associations between children's effortful control and academic adjustment did not vary across sex of the child or ethnicity. Mediation analyses indicate an indirect effect of effortful control on school readiness, through children's internalizing problems. Practice or Policy: Effortful control emerged as a strong predictor of academic adjustment among kindergarten children from low-income families. Strategies for enhancing effortful control and school readiness among low-income children are discussed.

Keywords

effortful control; academic adjustment; school readiness; behavior problems; peer relations

Past research indicates that children's early school experiences affect later adjustment and achievement (Duncan et al., 2007; Entwisle, Alexander, & Olson, 2005; Hamre & Pianta, 2001; Sabol & Pianta, 2012). Specifically, children's early problems in school predict later delinquency, school dropout, and poor mental health (Caspi, Elder, & Bem, 1987; Ensmigner & Slusarcick, 1992; Tremblay, et al., 1992). Unfortunately, as early as kindergarten many children form negative attitudes toward school and these attitudes can lead to school disengagement and lower academic achievement (Ladd, Buhs, & Seid, 2000). Moreover, few school experiences after third grade have enough weight to alter an already established course of achievement (Alexander & Entwisle, 1988). Despite these findings, specific mechanisms of influence on early academic achievement are in need of further examination.

Children's school readiness and making a successful transition to formal schooling play a salient role in later school success (Duncan et al., 2007; Rimm-Kaufman & Pianta, 2000; Sabol & Pianta, 2012), and more research is needed to identify factors that can reliably account for the quality of the transition to kindergarten. In the literature, an effective transition to school is defined in a variety of ways (see Kagan & Neuman, 1998), but most definitions involve a successful adaptation from home to formal schooling over a multi-year period. Despite children coming from a variety of early care and educational settings, kindergarten is typically a child's first formal schooling experience and first extended opportunity (i.e., full day) to interact with many children his/her age (Vecchiotti, 2001). Love and Yelton (1989) consider the transition to kindergarten as the most critical passage in early childhood, and this can be a stressful time as children adjust to the demands of a new environment, new roles, and new expectations (Dunn, 1988).

In particular, children from low-income families are at increased risk for poor academic achievement and deficits in school readiness skills (Cutting & Dunn, 1999; Felner, Brand, DuBois, Adan, Mulhall, & Evans, 1995; Xue, Leventhal, & Brooks-Gunn, 2005). The findings of the 2007 School Readiness Survey conducted by National Center for Education Statistics indicate that less than 50% of three to six year-old children in poor families are proficient in basic literacy skills such as recognizing letters and counting to 20, and that literacy skills were approximately 20% higher among children from middle to high income families (O'Donnell, 2008). Nevertheless, several studies suggest that many children from low income backgrounds demonstrate resilience and do well in school despite contextual difficulties (Elias & Haynes, 2008; McLoyd, 1998). It is important then to identify the protective factors that counter the deleterious effects of socioeconomic risk. Hence, in the current study we examined the role of temperamental characteristics (i.e., effortful control) and social adjustment (behavior problems and peer relations) in predicting school readiness and academic achievement among children from primarily low-income families.

Effortful Control

Effortful control is defined as a child's ability to utilize attentional resources and to inhibit behavioral responses in order to regulate emotions and related behaviors (Rothbart, Ahadi, & Hershey, 1994). Children's effortful control has been linked to difficulties in regulating negative emotions, such as anger and sadness, and to emotional and behavioral problems in many studies (Eisenberg, et al., 1996, 2001; Eisenberg & Fabes, 2005; Morris et al., 2002; Morris, Silk, Steinberg, Myers, & Robinson, 2007). Moreover, there is evidence from

longitudinal investigations that low effortful control predicts the development of adjustment difficulties (e.g., Eisenberg, et al., 1997, Eisenberg et al., 2009).

Effortful control is particularly important during early schooling where children are learning the skills of self-regulation outside of the home. Children must learn to recognize and control their own emotions in order to be ready to learn; likewise, they must be able to recognize and react to the emotions of their peers in order to get along with their classmates (Rimm-Kaufman & Pianta, 2000), and effortful control is essential in supporting these regulatory abilities. Consistently, there is a burgeoning amount of evidence suggesting that children's effortful control is associated with social competence among peers, low levels of behavior problems, academic achievement (Cicchetti, Ackerman, & Izard, 1995; Cole, et al., 2004; Eisenberg et al., 1997; Eisenberg, et al., 2003; Frick & Morris, 2004; Silk, Steinberg, & Morris, 2003), school liking (Iyer, Kochernderfer-Ladd, Eisenberg, & Thompson, 2010) and school engagement (Valiente, Lemery-Chalfant, & Castro, 2007). However, few studies have examined effortful control and academic achievement in low-income, diverse samples.

In early schooling, effortful control has been linked to school readiness and academic success (Nathanson, Rimm-Kaufman, & Brock, 2009; Shields, Dickstein, Seifer, Giusti, Magee, & Spritz, 2001), and in longitudinal studies effortful control has predicted academic outcomes (McClelland, Connor, Jewkes, Cameron, Farris, & Morrison, 2007; Valiente, Lemery-Chalfant, & Swanson, 2010). Additionally, research has begun to link effortful control to academic achievement independent of intelligence (Blair & Razza, 2007; Howse, Calkins, Anastapolous, Keane, & Shelton, 2003; Skinner, Zimmer-Gembeck, & Connell, 1998). Nevertheless, reasons why effortful control predicts children's success in school are in need of further study.

Social Competence and Behavior Problems

Indeed, relationships with peers and teachers play an important role in children's early school attitudes, school success (Ladd, Kochenderfer, & Coleman, 1996; Pianta & Steinberg, 1992), and adaptation to school (Ladd, et al., 1996). Wasik, Wasik, and Frank (1993) found that children's peer rejection or acceptance in the first three months of kindergarten predicted academic achievement in third grade. Similarly, in a 4-year longitudinal study, peer victimization was concurrently and predictively linked to low school engagement as well as poor academic achievement (Iyer et al., 2010). Children with good peer relations also tended to like school better and were more engaged in school. Moreover, numerous studies indicate that children who are rejected by their peers or are chronic victims of bullying are more likely to suffer from internalizing disorders as well as school related problems such as dropping out and absenteeism (Boulton & Underwood, 1992; Graham & Juvonen, 1998). Eisenberg and colleagues (2005) suggest that the link between effortful control and school success is perhaps mediated through children's social competence. Specifically, effortful control leads to better peer relations and fewer behavior problems (Spinrad et al., 2006). Peer relationships, in turn, help children stay engaged and do better in school (Kingery, Erdley, & Marshall, 2011). Although Zhou, Main, and Wang (2010) tested and found support for a consistent indirect effects model with social competence mediating relations between effortful control and GPA, more research is needed on children from low-income families.

Another dimension that represents children's poor socio-emotional adjustment is the severity of their problem behavior. A number of studies have shown that internalizing and externalizing problems greatly undermine children's ability to develop relationships with peers and teachers (e.g., Berry & O'Connor, 2010), and behavior problems have been linked to poor academic outcomes (Bulotsky-Shearer & Fantuzzo, 2010). Although past findings

generally support links between children's externalizing behavior and academic outcomes, there is less evidence highlighting the role of internalizing problems in children's school success. However, research does suggest that when children have internalizing problems such as anxiety they tend to obtain lower scores on cognitive tests (e.g., Rapport, Denney, Chung, & Hustace, 2001). Notably, a longitudinal study found that although both internalizing and externalizing behaviors predicted poor school performance, only the rise in internalizing behavior was linked to corresponding decreases in school performance (Bub, McCartney, & Willet, 2007). Collectively, these findings underscore the need to closely examine the role of internalizing behavior problems in children's school achievement.

In the current study, we were interested in ascertaining the relative importance of both effortful control and social competence (absence of behavior problems and positive peer relations) in academic adjustment (i.e., achievement/skills and school readiness). Few studies have examined how these constructs work in concert to affect children's academic adjustment in early educational settings, and there is a dearth of research on effortful control and children's socio-emotional adjustment among low-income children. Because low-income children are at increased risk for school-related difficulties (e.g., Felner et al., 1995), it is essential to further our understanding of factors associated with early school success. Based on the literature reviewed, we posited direct as well as indirect effects of effortful control on children's academic adjustment. Social competence variables were examined as potential mediators between children's effortful control and academic adjustment in order to further our understanding of mechanisms of influence (see Valiente, Lemery-Chalfant, Swanson, & Reiser, 2008; and Zhou et al., 2010).

Study Aims

Specifically, first we hypothesized that children's effortful control would be positively associated with indices of academic adjustment (school readiness, math and reading skills). Second, we posited that children's behavior problems and peer rejection would be negatively associated with their academic adjustment. Next, we expected to find indirect effects of effortful control on school adjustment through behavior problems and peer rejection. Finally, we explored the role of demographic characteristics—family income (although primarily a low-income sample, there was considerable variability) and sex of the child—in accounting for children's academic adjustment. We tested the hypotheses using data collected over a period of one year utilizing a short-term longitudinal design. Teacher report of effortful control was collected early in the first month of kindergarten, teacher report of behavior problems and child report of peer relations were collected in the middle of the school year, and teacher report of academic adjustment was collected at the end of the school year.

Method

Participants

Seventy-four 5–6 year old kindergarten children, [41 boys (55.4%) and 33 girls (44.6%)] and their teachers ($N = 6$) participated in this study with the data collected in two public elementary schools in a large urban, southern city. School principals and the school district allowed all kindergarten classrooms in the schools to participate ($N = 6$ classrooms). The ethnic makeup of the sample included 45 (60.8%) White participants, seven (9.5%) Black participants, 11 (14.9%) Latino participants, five (6.8%) Asian participants, three (4.1%) multi-racial participants, and three (6.2%) children of other nationalities. According to participant reports of annual household income, seven children were from families of less than \$10,000, 17 were between \$10,000–\$20,000, 16 were between \$20,000–\$30,000, 17 children between \$30,000–\$40,000, seven children between \$40,000–\$50,000 and 10

children had annual household incomes above \$50,000. The sample distribution based on income indicated that a high percentage of children came from economically disadvantaged homes, and schools were targeted based on a high percentage of children eligible for free-reduced school lunches. Recruitment began prior to the beginning of the fall semester, during mandatory kindergarten testing. Sixty-two percent of all kindergarten students from the two schools participated, with percentages for each classroom's participation ranging from 58% to 72%.

Procedures

During mandatory kindergarten testing, parents were informed of the study, and interested parents completed consent forms for their child's participation and provided basic demographic information. Parents were informed that consent was completely voluntary and had no bearing on their relationship with their child's school. Teachers were given a copy of the parents' consent to obtain information about his/her child, and were given their own consent form to sign.

At the beginning of the fall semester, teachers completed questionnaires on children's effortful control. In the middle of the school year, teachers completed questionnaires on children's internalizing and externalizing problems. Also at that time, in order to assess peer rejection, children engaged in individual sociometric interviews regarding peer liking, during school hours in a quiet, designated space at the child's school. At the end of the school year, teachers completed a questionnaire assessing each child's academic achievement (i.e., math and reading skills) and school readiness. Total teacher participation was estimated to take approximately 30 minutes per child, and teachers were given a digital device with teacher software valued at \$250 for their participation. All procedures were approved by the University's Institutional Review Board prior to the study.

Measures

Effortful control

Child Behavior Questionnaire (CBQ) - (teacher report): Teachers completed shortened scales of the Child Behavior Questionnaire (CBQ) in order to assess effortful control. The Children's Behavior Questionnaire (CBQ) was designed to measure temperamental characteristics of preschool and early school-age children (Goldsmith & Rothbart, 1991). Scale items are rated on a 7-point Likert scale ranging from 1 (extremely untrue) to 7 (extremely true), and in the current study, mean scale scores were calculated with higher scores indicating higher levels on the scale dimension. Scales assessed children's level of inhibitory control (capacity to plan and to suppress inappropriate action), and attention shifting and focusing (capacity to maintain attention on tasks or shift attention away from a task). The attention scales and inhibitory control scales were combined as an indicator of effortful control (see Eisenberg, et al., 2005; Morris et al., 2002). The shortened scales of the CBQ have demonstrated good reliability and validity. Internal consistency of scales is estimated to range from .67 to .94, and scale scores have been correlated with similar observed constructs and child adjustment (see Eisenberg et al., 1997; Goldsmith and Rothbart, 1991). In the current study alphas ranged from .84 to .92.

Behavior problems (internalizing and externalizing problems)

Child Behavior Scale (CBS): Teachers completed the Child Behavior Scale (CBS), which assesses children's social competence and psychological and behavioral adjustment (Ladd & Profilet, 1996). In the current study, the aggression scale (e.g., "fights with other children") was used as an indicator of externalizing problems, and the anxiety/fearful scale ("worries about many things") was used as an indicator of internalizing problems. Scale items are

rated on a three-point scale ("seldom", "sometimes", or "often"). A mean score was calculated for each scale, with higher scores indicating more adjustment difficulties. The CBS has demonstrated good construct validity, internal consistency (alphas = .77 to .96), and stability over time (Ladd & Profilet, 1996). The alphas for the current study were .90 for aggression and .79 for anxiety/fear.

Peer relations (peer acceptance and rejection)

Sociometrics interview: Using procedures outlined by Asher, Singleton, Tinsley, and Hymel (1979), children were asked to identify how much they like to play with each participating child in their classroom. Children were shown pictures of their classmates (only those participating in the study) and asked to place the child in one of three piles ranging from "1=Do Not Like" to "3=Really Like." Smile, frown and neutral faces were used with each pile to facilitate children's understanding. Children were allowed to nominate peers from both sexes. Peer rejection scores were calculated by averaging all classmate responses for children who participated in the study, which averaged 62% of children across classes. For each child, a percentage score of how often each child was nominated for the least liked category was calculated as an index of peer rejection.

Academic adjustment (academic achievement and school readiness)

Teacher perceptions of skills – (teacher report): Teachers were asked to compare each child to other children in the class and rate each child on a variety of skills including: reading and writing skills (reading scale), logical thinking and use of numbers (math scale), and school readiness (Meisels, 1996). Each of the items were rated using a 4-point scale reflecting the degree to which the child has accomplished a particular skill or behavior. The 9-item reading scale consisted of statements such as "recognizes some common words" and "uses context clues to predict meaning", while the 10-item math scale consisted of items such as "uses counting reliably to quantify numbers." Alphas in the current study were .95 for reading and .96 for math scales. Higher scores denoted proficiency in the subject areas assessed. School readiness was evaluated using three questions that asked teachers to assess on a scale from 1 (very difficult) to 5 (very easy) the ease with which each child was able to adjust to the different demands of kindergarten. The 3-item school readiness scale had an alpha of .92. These scales have been validated and shown to have good internal reliability in a study assessing similar constructs (Fabes, 2001).

Results

Descriptive Analyses

Means, standard deviations, and the ranges for all the major variables are presented in Table 1. All variables were tested for differences on child ethnicity, child gender, and household income. Ratings on the assessed variables did not vary significantly based on child ethnicity. Independent samples t-tests indicated that effortful control differed significantly by sex of the child, $t(72) = -3.77, p = .00$, with boys ($M = 4.23, SD = 1.16$) having lower levels of effortful control compared to girls ($M = 5.20, SD = 1.04$). Analysis of variance (ANOVA) indicated that school readiness differed significantly by levels of household income. Children from households earning \$10,000 or less had the lowest mean levels of school readiness, $F(1, 80) = 5.40, p < .05$. Post-hoc independent samples t-tests indicated that this group differed significantly from every other income category.

To further explore the effects of demographics variables, sex of the child, income, and ethnicity were examined as moderators between effortful control and each academic adjustment variable (Baron & Kenny, 1986). Moderation was not found, and analyses indicate that associations between children's effortful control and academic adjustment (i.e.,

reading and math skills, school readiness) do not vary by ethnicity, sex of the child, or household income. Thus, effortful control remained a significant predictor of academic adjustment regardless of demographic differences.

Hypothesis 1: Main Effects

Pearson correlations among all major variables are presented in Table 1. Effortful control was significantly correlated with all major variables in expected directions. Effortful control was significantly related to lower externalizing problems, internalizing problems, and peer rejection. Effortful control was significantly related to higher levels of school readiness, reading skills, and math skills.

Behavior problems (internalizing and externalizing) and peer rejection were significantly associated with most of the academic adjustment variables in expected directions. Externalizing problems was significantly associated with higher peer rejection and lower school readiness. In addition, internalizing problems was significantly associated with lower levels of school readiness, reading skills and math skills. Peer rejection was significantly related to lower levels of school readiness, reading skills, and math skills. Taken together, as expected, these correlations suggest that effortful control is positively associated with academic adjustment, whereas behavior problems and peer rejection are negatively associated with academic adjustment.

Hypothesis 2: Relative Importance of Constructs and Mediation Analysis

In order to examine the relative importance of effortful control and socio-emotional adjustment (behavior problems and peer rejection) in predicting academic adjustment, regression analyses were utilized. The tested academic adjustment variables were school readiness, reading skills, and math skills. Each outcome variable was regressed on the demographic variables, effortful control, and three dimensions of socio-emotional adjustment. Results indicate that children's effortful control is a significant predictor of school readiness, math, and reading achievement (see Table 2). Behavior problems and peer relations generally did not contribute to children's academic adjustment above and beyond the effects of effortful control. One exception is for internalizing problems, where both effortful control and internalizing problems were found to be significant predictors of school readiness (see Table 2). Household income was found to be a strong and significant predictor of all three indicators of school adjustment, even after controlling for children's temperament and socio-emotional adjustment.

Finally, we tested for indirect effects of effortful control on academic adjustment through the socio-emotional variables, using a multiple mediation approach as recommended by Preacher and Hayes (2008). Using a multiple mediation approach instead of many separate simple mediation tests allows for the several, often related, mediators to jointly contribute to a total indirect effect as well as to compare the individual contributions of each mediator to this overall effect, all the while reducing omitted variable bias since all mediators are controlled for in all of the analyses. To compute the indirect effect, each hypothesized mediator (externalizing behavior, internalizing behavior and peer rejection) was regressed on effortful control, the other mediators, and the gender and household income controls. Coefficients from these regressions are then used with the coefficients from the regressions in Table 2 to construct product-of-coefficient estimates of the various individual indirect effects. The total indirect effect of effortful control on the given dependent variable is then the sum of the various indirect effects through the multiple mediators. Since use of traditional normality assumptions regarding standard errors based on asymptotic theory have been shown to be erroneous when applied to these estimated indirect effects, especially in smaller samples (e.g. Preacher and Hayes, 2008; MacKinnon et. al., 2002), significance of

the indirect effects was assessed by 95% confidence intervals constructed via biased-corrected bootstrapping using 10,000 bootstrap samples. The indirect effect is significant if the confidence interval does not contain zero. The results regarding the indirect effects are presented in Table 3. The results indicate a total indirect effect of effortful control on school readiness. Examining the individual contributions of the socio-emotional mediators indicates that this is primarily through internalizing behavior. No indirect effects were found for the impact of effortful control on math or reading skills.

Discussion

The current study contributes to the extant literature in a number of ways. First, the study utilized a diverse (40% ethnic minority), primarily low income sample of children to investigate factors that contribute to a successful transition to kindergarten. In addition, this is one of only a few studies to investigate the relations among effortful control, behavior problems and peer rejection in the prediction of school readiness and academic achievement in a kindergarten sample using a short-term longitudinal design. The importance of a research design that considers temperament as well as social competence in accounting for children's early academic adjustment is indicated by the moderate to strong correlations among all assessed variables with the three dimensions of academic adjustment. A recent review by Denham (2006) highlights the importance of social-emotional competencies in school success and proposes ways for "raising the bar" on how we evaluate school readiness. The current focus on accountability in the educational system makes it necessary for researchers to reevaluate traditional perspectives on school competencies. A child-focused model of school readiness and achievement that heavily emphasizes academic outcomes is limiting (Mashburn & Pianta, 2006). Rather, conceptualizing school adjustment as a multidimensional, relationship-based construct allows for a deeper and more thorough understanding of children's competencies. One of the methodological strengths of the current study is the use of child report of peer relations. The fact that children's report of peer relations was linked to teachers' report of academic success is striking, and highlights the importance of peer relations in early school adjustment (see Ladd et al., 1999).

Our study findings indicate that effortful control is a strong correlate of school readiness and achievement among kindergarteners. In fact, the effects of effortful control were not affected (moderated) by demographic variables. In other words, irrespective of children's sex and household income children with high effortful control demonstrated better school readiness, math and reading skills. Our data suggest more of a direct effects model, with indirect effects found only for internalizing and school readiness. Nevertheless, more research is needed to fully understand the complex linkages among socio-emotional adjustment and school success (see Zhou, Main, & Wang, 2010).

These findings confirm past research suggesting that effortful control is one of the most important components of school success (see Blair, 2002). Studies have shown that children who are temperamentally less hyperactive and exhibit higher levels of emotion regulation are seen as more "teachable" by teachers, and tend to achieve at higher levels academically compared to children low in emotion regulatory abilities (Keogh, 1986; Martin, Drew, Gaddis, & Moseley, 1988).

In addition to the significance of effortful control, findings also indicate that the effect of effortful control on school readiness is partially indirect through children's internalizing problems. Past research has pointed to the strong role of anxiety in school performance (Call, Beer, & Beer, 1994; Dobbs, Doctoroff, Fisher, & Arnold, 2006; Thompson, Lampron, Johnson, & Eckstein, 1990). Additionally, internalizing behaviors are often more difficult than externalizing behaviors to observe, especially in large classrooms. Therefore, teacher

ratings of higher internalizing behaviors may represent extremes in this category and account for stronger relations with school adjustment variables. Moreover, children who have difficulties with effortful control may be more likely to suffer from anxiety and depression, leading to problems in school adjustment, as was found in our study. Our findings also indicate that household income predicts better overall academic adjustment, even when controlling for effortful control, behavior problems, and peer rejection. This finding is rather surprising given the somewhat low variability in the income levels in the sample. However, it is important to note that even minor income differences can affect children's performance in school.

Taken together, these findings strengthen previous support for the important role of effortful control in school adjustment. The finding that externalizing behaviors and peer rejection did not show negative effects on children's academic adjustment after controlling for effortful control was surprising, as was the general lack of indirect effects through peer rejection and externalizing problems. We predicted that effortful control would affect behavior problems and peer relations, which in turn would affect academic adjustment, but this was only found to be true for internalizing behavior and school readiness. One possible reason for this lack of extensive mediational findings may be because regulatory patterns of effortful control are already greatly established by kindergarten (Eisenberg & Morris, 2002). However, mediation has been found in other studies (see Valiente et al., 2008; and Zhou et al., 2010), and these studies examined mediators among elementary age children. Thus, it may be that social mechanisms of influence are less focused during kindergarten, despite regulatory patterns being established in early childhood.

Our study findings should be viewed in the context of some limitations. All variables except peer rejection were measured by only teacher report. Consequently, lack of significant prediction by peer rejection when controlling for effortful control could be an artifact of method variance. However, this is unlikely given the strength of effortful control in the prediction of academic adjustment variables, and similar findings have been found in other studies (e.g., Miller, Gouley, Seifer, Dickstein, & Shields, 2004). Findings are also limited by a lack of parent report of temperament, which would add to the validity of the assessment of effortful control across contexts, and a lack of standardized academic assessment data. In addition, the data collection points in this study were separated by an average of three to six months. Although this time period represents a period of significant cognitive (Downey, von Hippel, & Broh, 2004) and socio-emotional gains for children (Marturano, 1981), future research could strengthen these findings by testing this relationship over longer periods of time. It should also be noted that this study is correlational in nature and that we cannot confirm that effortful control *caused* academic adjustment, although constructs were measured at separate time points. It is likely that socio-emotional and academic adjustment affect effortful control, but developmentally, we would expect effortful control to be the precursor to such adjustment variables (see Eisenberg & Morris, 2002). Other study limitations include a small sample size and a lack of controlling for children's IQ in analyses. Thus, findings cannot be assumed to be independent of children's general intelligence, and larger study samples are needed in future studies.

Despite these limitations, results of this study have important implications for educational policies and practice. Based on these findings, fostering regulatory skills and improving social skills are important areas for intervention to increase school readiness and achievement. Although effortful control is a temperamental construct (Rothbart & Bates, 2006), certain environments may put children at additional risk for poor regulation. For example, in a longitudinal study by Li-Grining (2007) ecological stressors such as an unsafe neighborhood or a single parent household had a cumulative negative effect on children's effortful control, but to some extent, positive parenting compensated for the adverse effects

of poverty. Prior research has also found that when parents are responsive, children develop better regulatory abilities (Kochanska et al., 2000). Similarly, Myers and Morris (2009) found that children with low effortful control demonstrate better socio-emotional adjustment when they share a close and positive relationship with their teachers. Mashburn and Pianta (2006) emphasize that social relationships are the foundational processes that enable children to gain school readiness skills, and that high quality early educational experiences characterized by positive emotional climates are related to academic and social success in school. Thus, intervention efforts to improve teacher and parent-child interactions may significantly bolster effortful control and academic achievement among children in low-income families.

The finding on household income and positive academic outcomes underscores the need to educate parents in low-income families about the importance of literacy activities such as reading to their children. Moreover, transition-to-school activities such as classroom visits and home visits connect children and families with their new teachers, allowing children opportunities to talk about their feelings and focus on the exciting aspects of the upcoming transition (Bredekamp & Copple, 1997). Such activities help children prepare emotionally for their new environment, increasing their comfort and decreasing their stress, and may be particularly important for children from low-income backgrounds. In conclusion, our study findings suggest that prevention programming focused on improving children's attention, self-regulation, and relationship skills should be targeted among low-income families and preschool centers located in high-risk neighborhoods (see for example, Greenberg, Kusche, Cook, & Quamma, 1995). Such programs will likely benefit children in a successful transition to school, and will prime them for academic success in kindergarten.

Acknowledgments

Work on this study was supported by a grant to the first author from the Eunice Kennedy Shriver National Institute of Child Health and Development, R03HD045501-01A1.

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Table 1

Correlation Matrix and Descriptive Statistics for Major Variables

Variable	1	2	3	4	5	6	7	8	Mean	SD
1. Sex	1.00									
2. Income	-.04	1.00							3.59	1.93
3. Effortful Control	.40**	.06	1.00						4.67	1.21
4. Externalizing Behavior	-.13	-.16	-.54**	1.00					1.34	.47
5. Internalizing Behavior	.10	-.07	-.27*	.05	1.00				1.38	.45
6. Peer Rejection	-.13	-.17	-.48**	.48**	.12	1.00			.26	.19
7. School Readiness	.21	.32**	.51**	-.31**	-.36**	-.37**	1.00		3.60	1.23
8. Math	.10	.28*	.42**	-.22	-.23*	-.33**	.82**	1.00	3.26	.72
9. Reading	.09	.17	.43**	-.21	-.26*	-.30*	.74**	.86**	3.37	.74

Note. For sex of child 1 = male and 2 = female.

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

Table 2

Summary of Hierarchical Regression for Predictors of Academic Adjustment

	School Readiness			Math Skills			Reading Skills		
	B	SE B		B	SE B		B	SE B	
1									
Sex	.61 [*]	.27	.25 [*]	.23	.16	.16	.22	.16	.16
Household Income	.25 ^{***}	.07	.38 ^{***}	.15 ^{***}	.04	.38 ^{***}	.11 [*]	.04	.29 [*]
R ²		.19 ^{***}			.16 ^{**}			.10 [*]	
F for equation		F (2, 68) = 7.99			F (2, 68) = 6.51			F (2, 68) = 3.78	
2									
Sex	.34	.25	.14	.03	.16	.02	.02	.16	.01
Household Income	.22 ^{***}	.06	.34 ^{***}	.13 ^{***}	.04	.35 ^{***}	.10 [*]	.04	.26 [*]
Effortful Control	.33 [*]	.13	.31 [*]	.23 ^{**}	.08	.37 ^{**}	.25 ^{**}	.09	.40 ^{**}
Externalizing Behavior	-.03	.32	-.01	.12	.20	.07	.13	.20	.08
Internalizing Behavior	-.75 ^{**}	.27	-.28 ^{**}	-.22	.17	-.14	-.29	.17	-.18
Peer Rejection	-.89	.72	-.14	-.56	.45	-.15	-.49	.46	-.13
R ²		.47 ^{***}			.37 ^{***}			.35 ^{***}	
R ²		.28 ^{***}			.21 ^{***}			.25 ^{***}	
F for equation		F (6, 64) = 9.46			F (6, 64) = 6.36			F (6, 64) = 5.80	

Note. For sex of child 1= male and 2= female. B is the unstandardized coefficient, is the standardized coefficient.

* p < .05;

** p < .01;

*** p < .001.

Table 3
Indirect Effects of Effortful Control on Academic Adjustment through Externalizing, Internalizing and Peer Rejection

	<u>School Readiness</u>			<u>Math Skills</u>			<u>Reading Skills</u>		
	<u>95% CI</u>			<u>95% CI</u>			<u>95% CI</u>		
	Effect	Lower	Upper	Effect	Lower	Upper	Effect	Lower	Upper
TOTAL	.19 *	.01	.36	.06	-.04	.13	.06	-.05	.15
Externalizing Behavior	.01	-.13	.15	-.02	-.12	.06	-.02	-.13	.07
Internalizing Behavior	.11 *	.02	.24	.03	-.01	.10	.04	-.02	.12
Peer Rejection	.07	-.06	.23	.05	-.05	.12	.04	-.07	.13

Note: Demographic Variables (Sex and Income) were controlled in all mediation paths. Effect is the product-of-coefficients effect size and the confidence intervals are bias-corrected bootstrap estimates.

*
p < .05