Growing Up with Assets and Risks: The Importance of Self-Regulation for Academic Achievement

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Abstract

This study examined children's self-regulation, demographic risks [English Language Learner (ELL) status, being from a low-income family], and academic achievement longitudinally across four time points (fall and spring of the prekindergarten and kindergarten years). Findings suggested that assets such as high self-regulation in the fall of prekindergarten were significantly related to children's academic achievement in prekindergarten and during the transition to kindergarten. The effect of self-regulation on achievement did not vary as a function of risk. Higher self-regulation significantly predicted higher academic skills regardless of risks. Discussion highlights the importance of assets, such as strong self-regulation, for early academic achievement.

Growing Up with Assets and Risks: The Importance of Self-Regulation for Academic Achievement

Children growing up in the context of risk are more likely to experience a variety of negative outcomes in childhood and beyond (Gutman, Sameroff, & Cole, 2003; Pungello et al., 2010). For example, children who are English Language Learners (ELLs) and/or are from a low-income family have significantly poorer academic trajectories (Galindo & Fuller, 2010; Han, 2012). Specifically, children experiencing risk early in life are more likely to struggle with a variety of outcomes including poor self-regulation (including the domains of attentional flexibility, working memory, and inhibitory control). These children are also more likely to start school behind their peers on academic achievement, with this gap persisting or widening over time (Li-Grining, Votruba-Drzal, Maldonado-Carreño, & Haas, 2010; McClelland, Acock, & Morrison, 2006). However, there is also evidence suggesting that personal assets such as strong child self-regulation may have positive effects on children's early and long-term academic trajectories (Andersson & Bergman, 2011; McClelland, Acock, Piccinin, Rhea, & Stallings, in press; Moffitt et al., 2011). Moreover, strong self-regulation may serve as a compensatory factor for children experiencing demographic risk (Sektnan, McClelland, Acock, & Morrison, 2010), suggesting the need to examine complex relations among self-regulation, demographic risk factors, and academic achievement.

The present study examined how assets (child self-regulation), and risks (being low-income and of ELL status) were associated with academic achievement over two years during the transition between preschool and formal schooling. Although self-regulation significantly predicts early academic skills (Blair & Razza, 2007; McClelland et al., 2007), few studies have investigated how this relation may be influenced by demographic risks. Thus, we also

investigated whether the relation between one personal asset, self-regulation, and academic achievement varied for children with different levels of demographic risks.

We focused on children's transition to formal schooling (ages 4-6) based on research indicating that rapid increases in the development of self-regulation and underlying executive function skills occur during this period, which makes it an especially important one for children's early learning (Diamond, 2002; Zelazo, Carlson, & Kesek, 2008). In addition, this time is especially critical for children who are of ELL status and/or who come from low-income families because these children are more likely to struggle with self-regulation and academic achievement (Evans & Rosenbaum, 2008; Wanless, McClelland, Tominey, & Acock, 2011). This trend is concerning because children's academic trajectories tend to be established early in life, and can set the stage for later academic success or failure (Entwisle, Alexander, & Olson, 2005).

Assets and Risks: Definitions and Relations to Academic Achievement

Personal Assets. We examined the contribution of one asset, high self-regulation to academic achievement across the transition to formal schooling. Self-regulation has previously been conceptualized as a personal asset (Li, Lerner, & Lerner, 2010; Urban, Lewin-Bizan, & Lerner, 2010), which has received substantial attention as a key mechanism for a range of developmental outcomes (Duckworth, Quinn, & Tsukayama, in press; Evans, Fuller-Rowell, & Doan, 2012; McClelland, Cameron Ponitz, Messersmith, & Tominey, 2010). Broadly speaking, self-regulation refers to the conscious control of thoughts, feelings, and behavior, and involves both emotional and behavioral self-regulation. For the purposes of this study, we focused on the behavioral aspects of regulation, which stem from underlying executive function processes of attentional flexibility or shifting, working memory, and inhibitory control (Best & Miller, 2010;

Garon, Bryson, & Smith, 2008; McClelland & Cameron, 2012). Together, these processes are important for learning and long-term academic success (McClelland et al., in press) and experience rapid development during the preschool years (Blair & Diamond, 2008; Garon et al., 2008). We focused on how these executive function processes translate into behavior especially in school and classroom settings, which are important learning contexts for young children.

Although considerable debate exists, research supports the view that self-regulation and related terms [e.g., intentional self-regulation or behavioral regulation (McClelland et al., 2007)] share conceptual underpinnings with constructs such as executive function, learning-related skills, and effortful control. Some of the differences in constructs and terminology are due to varying theoretical perspectives. For example, executive function stems from the cognitive psychology and neuroscience fields (Blair, Zelazo, & Greenberg, 2005; Zelazo et al., 2008), learning-related skills, intentional self-regulation, and behavioral regulation stems from the field of human development (Gestsdóttir & Lerner, 2007; McClelland et al., 2006; McClelland et al., 2007), and effortful control is based in the temperament literature (Allan & Lonigan, 2011; Eisenberg, Valiente, & Eggum, 2010; Liew, 2012). However, all terms and constructs share the conceptualization that regulation of cognition and behavior is voluntary and flexible rather than an automatic response (Eisenberg, Smith, & Spinrad, 2011; Zelazo et al., 2008). We use the term self-regulation to refer to the integration of attentional flexibility, working memory, and working memory (McClelland & Cameron, 2012). We focused on how high self-regulation may be an asset that predicts higher academic achievement over a two-year period between preschool and kindergarten. In addition, we examined if the importance of self-regulation for academic achievement varied for children who experience demographic risk, namely being of ELL status or from a low-income family. In other words, we were interested testing the hypothesis that self-

regulation significantly predicts higher academic achievement in young children regardless of whether they were from a low-income family or of ELL status.

Demographic Risks. Research consistently finds that children experiencing early demographic risk are more likely to have significant difficulties as they progress through childhood and adolescence (Gutman et al., 2003; Lengua, 2009; Sektnan et al., 2010). Two risk factors of particular importance for young children entering formal schooling are being an English-Language Learner (ELL) and coming from a low-income family. A number of studies indicate that children who are of ELL status enter school significantly behind their peers academically and remain behind over time (Galindo & Fuller, 2010; Han, 2012; Reardon & Galindo, 2009). Research also finds that children from low-income families have significantly lower self-regulation and academic achievement than their more advantaged peers (Evans & Rosenbaum, 2008; Sektnan et al., 2010). Moreover, children who are of ELL status are more likely to be in low-income families (Han, 2012; Reardon & Galindo, 2009), which makes it especially important to consider the effects of these risks factors on children's academic trajectories. Low-income ELLs are also more likely to struggle with self-regulation, which has important implications for their academic success (Wanless, McClelland, Tominey, et al., 2011).

Although little research has examined the mechanisms driving these relations, a few reasons have been proposed. One possible contributing factor is differences in parenting between children of ELL status (Spanish-speaking children) and English-speaking children. For example, in some research, Hispanic parents have been found to be more controlling and focused on compliance in their parenting style than non-Hispanic parents (Brooks-Gunn & Markman, 2005), which has been related to lower levels of self-regulation in children (Kochanska & Knaack, 2003). Related to this, research has demonstrated that parenting that includes a focus on

supporting autonomy and limit setting has significantly predicted strong self-regulation in children (Bernier, Carlson, & Whipple, 2010; Lengua, Honorado, & Bush, 2007). However, some research has not found that Hispanic parents are more controlling than other parents (Halgunseth, Ispa, & Rudy, 2006), suggesting that the issue is likely confounded by other factors such as income and parent education level. Related to this, research has indicated that children from low-income families are more likely to experience family and housing instability, a lack of resources, and a lower-quality learning environment in the home, all of which have been linked to lower levels of self-regulation (Gershoff, Aber, Raver, & Lennon, 2007; Mistry, Benner, Biesanz, Clark, & Howes, 2010; Obradovic, 2010; Sektnan et al., 2010).

Together, this research suggests that factors related to elevated stress and being from a low-income family combined with possible differences in parenting could contribute to low-income children of ELL status having significant difficulty with self-regulation. Although more research is needed, it is possible that low-income children who are of ELL status have parents who provide fewer opportunities to practice self-regulation (Wanless, McClelland, Tominey, et al., 2011). These children may also have higher levels of stress, which interferes with the development of prefrontal cortex, experience more family and housing instability, and have fewer learning and economic resources (Blair, 2010; Blair & Raver, 2012). This is important because accumulating evidence suggests that self-regulation is an important predictor of academic achievement in children (Blair & Razza, 2007; Sektnan et al., 2010). Thus, being of ELL status and being from a low-income family may have unique and adverse effects on academic achievement.

Complex Relations among Self-Regulation, Risk and Early Achievement

A final goal of the study was to consider whether relations between children's self-regulation and academic achievement vary as a function of risk between preschool and kindergarten. Recent research has identified the need to look at complex (e.g., mediational and moderational) relations between self-regulation, risk, and children's outcomes (Mistry et al., 2010). Such a view furthers our understanding of the influences on children's trajectories to identify how and when to intervene for children at risk. One study found that children's self-regulation significantly mediated relations between early family risk and children's academic outcomes in first grade. Moreover, children with higher self-regulation had significantly higher academic achievement, regardless of the presence of risk factors such as being in chronic poverty or having mothers with chronic depressive symptoms, suggesting that self-regulation may be an important compensatory factor for young children at risk (Sektnan et al., 2010).

Related research has also found that relations between early risk (e.g., poverty, maternal depression, parental warmth) and school readiness (including aspects of self-regulation) did not vary by race/ethnicity (Mistry et al., 2010) and that relations between broad aspects school readiness and academic achievement were mostly equivalent across large samples of White, Black, and Hispanic children (Li-Grining et al., 2010; Raver, Gershoff, & Aber, 2007). Based on these findings, self-regulation may be universally beneficial across children who are experiencing different risk factors. However, there is little research on this issue, in spite of the importance of establishing if relations between self-regulation and academic achievement vary as a function of context. For example, it is currently unclear if self-regulation continues to exert importance predictive value for children who are of ELL status or from low-income families. Thus, we examined if the effects of self-regulation on children's early achievement would prevail in spite of significant demographic risk.

In the present study, we also controlled for maternal education level based on research finding that maternal education can have significant implications for children's academic success. Although often used as a proxy for income or SES, maternal education can have an important influence on children's learning beyond the effects of income. (Davis-Kean, 2005; Magnuson, Sexton, Davis-Kean, & Huston, 2009). Thus, we included maternal education level in our models in addition to examining low-income status as a demographic risk variable.

Goals of the Present Study

The present study had two research questions. First, we examined how a personal asset (high child self-regulation) and demographic risks (being from a low-income family, being of ELL status) at the fall of prekindergarten were related to children's academic skills in the fall of prekindergarten and their growth in skills over four time points (fall and spring of prekindergarten and fall and spring of kindergarten). We expected that self-regulation (an asset) would significantly predict children's academic level and growth over the transition to kindergarten (Blair & Razza, 2007; McClelland et al., 2007).

For the second research question, we investigated whether the effect of self-regulation on academic achievement varied across risk factors (being from a low-income family or being of ELL status). Based on other research examining moderator relations between early family risk and other aspects of school readiness in children (Mistry et al., 2010; Raver et al., 2007), we expected that the effect of self-regulation on early achievement would not vary across children experiencing different risk factors. Thus, we expected that the predictive value of self-regulation on academic achievement would be present for children regardless of whether children were from a low-income family or of ELL status.

Method

Participants

The sample included 134 children from a rural community in Oregon with mixed socioeconomic status. Children and families were recruited at six preschools that were accredited by the National Association for the Education of Young Children (NAEYC). Most children were attending half-day preschool programs. Small gift certificates were given to the families who participated in the study. Of the total sample, ages at the beginning of the study ranged from 44 - 62 months (*M*= 55.22, *SD*= 3.51), 53% were girls, and mother's education level ranged from 4th grade to a doctoral degree with the average education level an Associate's degree (*M* = 14.65 years, *SD* = 3.78; see Table 1). The children were followed over four time points: fall and spring of prekindergarten, and fall and spring of kindergarten. The children attended six schools in prekindergarten and 16 elementary schools in kindergarten. Over time, the sample size decreased from 134 at Time 1 to 123 at Time 2, 110 at Time 3, and 83 at Time 4. In other words, 83 children participated in all four time points of the study. Attrition was not significantly related to child age, gender, mother's education, or ELL status. It was, however, significantly related to being from a low-income family, and to Time 1 math and reading scores. In the present analyses, the data were multiply imputed as part of using the Bayesian estimator. In this imputation, low-income status, Time 1 math, and Time 1 reading were part of the imputation model, and thus may be thought of as auxiliary variables. As such, their significant relations to attrition were accounted for during analyses.

In the present study, we focused on one personal asset for children (high self-regulation) and two demographic risks (being from a low-income family and being of ELL status). According to teacher-report at the beginning of the study, 19% of the children spoke Spanish as their primary language. Of this group, ages ranged from 51-62 months (*M*=56.33, *SD*=2.88),

46% of the ELLs were girls, and 96% were from low-income families. Mother's education level ranged from 4th grade to a bachelor's degree, with over half of the mothers having a ninth grade level of education or less. Initial self-regulation for this group spanned across the range of the HTT self-regulation task (0-19 points, *M*=5.33, *SD*=6.70).

About 46% of the children were considered to be from low-income families because their teachers identified them as being funded by Head Start. In this sample, children who were funded by Head Start were in the same classroom as children who were not funded by Head Start. Therefore, this characteristic reflected the child's family income and not of the type of classroom or teaching that the children experienced. For the low-income children, ages ranged from 44-62 months (*M*=55.93, *SD*=3.63), 44% were girls, and 42% were of ELL status. The education level of mothers in this group ranged from 4th grade to a master's degree. The majority of mothers had a high school degree or less. HTT self- regulation scores at Time 1 ranged from 4-18 points (*M*=5.89, *SD*=6.72).

Procedure

Self-regulation and academic tasks were given to children by research assistants in the fall and spring of prekindergarten and kindergarten. At each time point, children were taken out of the classroom to a quiet space in the school and assessed for 10-15 minutes. Children of ELL status were given the tasks in Spanish by research assistants who were native Spanish speakers.

Measures

Background Questionnaire. A questionnaire about children's age, gender, and mother's education level was completed by parents in either English or Spanish.

Self-Regulation. The Head-to-Toes task is a direct assessment of self- regulation that has been used in previous studies with culturally diverse samples, including Spanish-speaking

children (McClelland et al., 2007; von Suchodoletz et al., in press; Wanless, McClelland, Acock, et al., 2011). Research assistants administer the task in about five minutes by explaining to the children that they are going to do the opposite of two paired commands: "Touch your head" and "Touch your toes" or "Touch your knees" and "Touch your shoulders." There are two versions of the task with four practice items and 10 task items in each version. One version starts with head/toes and the other version starts with knees/shoulders. There were no significant differences in children's performance by research assistant or by version of the task. Children receive 0 points for an incorrect response (touching your head when asked to touch your head), 2 points for a correct response (touching your toes when asked to touch your head), and 1 point for a self-correct response (initially touching your head when asked to touch your head, but quickly changing your response to touching your toes). Total scores range from 0 to 20 points.

Academic Achievement. To assess mathematics, reading, and vocabulary, subtests from the Woodcock-Johnson Psycho-Educational Battery-III Tests of Achievement (Woodcock & Mather, 2000) or the most recent Spanish version available, the Bateriá Woodcock-Muñoz-R (Woodcock & Muñoz-Sandoval, 1996), were used. Each version of the test had its own norms and children's scores were based on those norms. Mathematics was assessed using Applied Problems, which included items about time, money, and quantity. Reading was assessed with Letter-Word Identification, which required children to name letters and read words. Vocabulary was assessed with Picture Vocabulary, which asked children to name pictures. These subtests have shown reliability greater than .85 (Woodcock & Mather, 2000).

Results

Analytic Strategy

We began our analyses by examining descriptive statistics (see Table 1) and checking variables for multicollinearity. All variance inflation factors (VIF) were calculated in Stata software and were below 3.00, which indicated that these variables could be included in analyses without concern about multicollinearity (Kline, 2005). Before conducting analyses, we examined the patterns of missingness in the data. The data appeared to be missing completely at random and were dealt with using Bayesian estimation, which is robust to small sample sizes. Our approach to this longitudinal analysis was to conduct multi-level analyses with time points (level 1) nested in children (level 2). The intercepts in these models, were conceptualized as a proxy for the estimated score at Time 1 (fall of prekindergarten), and thus were conceptualized as initial standing on the academic outcome for each model. These multi-level growth curve models included all of our independent variables as time-invariant and were entered at the child level (level 2). Based on unconditional models analyzed in Mplus Version 6.1 (Muthén & Muthén, 2010), intraclass correlations were .64 for reading, .70 for math, and .78 for vocabulary. These values underscored the nested structure of the data.

Personal Assets and Demographic Risks on Academic Achievement

We first examined relations between a personal asset (high child self-regulation), demographic risks (being from a low-income family and being an ELL) and academic skills. Controlling for child age, gender, and maternal education level, results indicated that self-regulation was significantly and positively related to initial math (B=1.25, *p*=.00) and reading achievement (B=.66, *p*=.02; see Table 2). Children who were one standard deviation higher than average on self-regulation in the fall of prekindergarten were likely to be 9.5 points higher (about one-half of a standard deviation) on initial math and over five points higher (about one-fifth of a standard deviation) on reading in the fall of prekindergarten. Moreover, self-regulation was

significantly related to estimated rates of math development over four time points (B=-.18, *p*=.01; see Figure 1), although not significantly related to estimated rates of reading development over the four time points (B=.05, *p*=.72; Figure 2). Specifically, scoring one standard deviation higher on self-regulation than average was related to about a 4 point decrease in the amount of growth in math skills between fall of prekindergarten and spring of kindergarten. This finding suggests that because these children started higher on self-regulation, they had less room to grow in math compared to their peers with lower initial self-regulation. Children with high initial self-regulation, however, remained higher on math skills compared to children with low self-regulation (see Figure 1).

For the demographic risks, being from a low-income family had significant negative relations with initial reading (B=-8.58, *p*=.00) and vocabulary skills (B= -6.01, *p*=.00), but not with mathematics skills (see Table 2). This finding meant that being from a low-income family was related to an initial reading score that was almost 9 points lower (over one-third of a standard deviation), and an initial vocabulary score that was six points lower (almost one-third of a standard deviation) than children who were not from low-income families. For ELL status, there was a significant negative relation with initial mathematics (B=-11.81, *p*=.00) and vocabulary skills (B=-10.29, *p*=.00; see Table 2). In other words, children who were ELLs were predicted to have an initial math and vocabulary scores that were over 11 and 10 points lower, respectively, (almost one-half a standard deviation lower for math, and about two thirds of a standard deviation lower for vocabulary) than children who were not ELL status. However, being low-income or ELL was not significantly related to children's growth in academic achievement over time.

In summary, high self-regulation in the fall of prekindergarten was related to stronger math and reading skills in the fall of prekindergarten. Moreover, higher self-regulation was significantly related to slower growth in math skills between fall of prekindergarten and spring of kindergarten, likely because these children started higher on self-regulation, so had less room to grow on math compared to their peers with lower initial self-regulation. In terms of demographic risks, ELL status was related to significantly lower vocabulary and math scores in the fall of prekindergarten. In addition to the effect of ELL status, being from a low-income family was associated with significantly lower vocabulary and reading scores in the fall of prekindergarten.

Self-Regulation and Demographic Risks on Academic Achievement

After looking at the main effects of assets and risks, we examined interactions between each risk factor and one asset, self-regulation, on achievement outcomes. No significant interactions were found between individual risk factors (low-income status, and ELL status) and self-regulation on fall prekindergarten achievement or rate of growth for any of the three academic skills. In other words, higher self-regulation significantly predicted higher math and reading skills regardless of whether children were from low-income families or were ELLs. Thus, the effect of self- regulation on children's academic achievement between prekindergarten and kindergarten was consistent across children with varying risk factors.

Discussion

The present study examined the relations between a personal asset (having high child self-regulation at the beginning of prekindergarten), and two demographic risks (being from a low-income family and being an English Language Learner) with academic achievement across prekindergarten and kindergarten. Self-regulation emerged as an important personal asset for

academic achievement and findings pointed to the universal importance of self-regulation for supporting early academic achievement.

Personal Assets and Demographic Risks on Academic Achievement

Results indicated that strong child self-regulation significantly predicted higher math and reading scores in the fall of prekindergarten, after controlling for demographic risk and other background variables such as maternal education level. Results parallel a large body of research finding that children's ability to pay attention, remember instructions, and demonstrate inhibitory control help them perform better on academic tasks and especially math early in their academic trajectories (Blair & Razza, 2007; Cameron Ponitz, McClelland, Matthews, & Morrison, 2009; McClelland et al., 2007). Specifically, the strong predictive relations between self-regulation and math fit other research that finds that strong attention, working memory and inhibitory control (components of self-regulation) may be especially helpful to solve math problems, which require children to follow a sequence of steps that become increasingly complex as they get older (Blair & Razza, 2007; Cameron Ponitz et al., 2009). Self-regulation also significantly predicted decreased gains in math between prekindergarten and kindergarten, suggesting that children who started higher on self-regulation had less room to grow on math compared to their peers with lower initial self-regulation. Although previous research has found that self-regulation significantly predicts increased gains in reading and vocabulary skills over time (Blair & Razza, 2007; McClelland et al., 2006; McClelland et al., 2007), the relatively small sample size in the present study may have made it more difficult to detect significant effects.

Results regarding demographic risks suggested significant and negative effects of the risk variables on academic outcomes. In particular, being from a low-income family was significantly related to lower reading and vocabulary skills at the fall of prekindergarten. Being of ELL status

was related to significantly lower math and vocabulary skills. Previous research has found that children from low-income families have lower academic skills including reading and vocabulary (Sektnan et al., 2010). The results showing that low-income and children of ELL status had significantly lower vocabulary skills may be due to the strong influence of parenting on children's vocabulary skills early in life (Hart & Risley, 1995), whereas the finding that low-income children had significantly lower early reading skills could reflect the impact of having lower quality home learning environments and resources in low-income families (Bradley, Corwyn, McAdoo, & García Coll, 2001; Gershoff et al., 2007). In addition, children of ELL status had substantially lower math and vocabulary skills compared to children from low-income families, which could reflect the additional challenges children of ELL status face having to learn in a non-native language. This is supported by recent work showing that ELL children enter kindergarten with significantly lower academic skills than other immigrant children and children who are not ELLs (Han, 2012; Reardon & Galindo, 2009). In our study, most of the ELL children were also low-income, which may make it difficult for these children to "catch up" to their more advantaged English-speaking peers on academic outcomes (Wanless, McClelland, Tominey, et al., 2011).

Taken together, results indicated that strong self-regulation was significantly related to stronger achievement levels in the fall of prekindergarten. This finding suggests that self-regulation is a key asset and parallels other research finds that strong self-regulation is a compensatory for children experiencing multiple risk factors (Sektnan et al., 2010). Thus, strengthening self-regulation may be an effective way to promote academic achievement in young children. Broad intervention programs, such as Head Start, which work to build personal assets, may provide a useful way to capitalize on their influences on academic outcomes.

Self-Regulation Relates to Academic Achievement across Demographic Risks

Relations between children's initial self-regulation and academic outcomes did not vary as a function of the risk factors between prekindergarten and kindergarten. Although being from a low-income family and being of ELL status had a negative influence on academic skills at fall of prekindergarten, these risk factors did not influence children's academic skill growth between prekindergarten and kindergarten in the present sample. This finding matches other recent research that indicates that relations between early risk and self-regulation (Mistry et al., 2010) and early self-regulation and academic achievement did not vary as a function of risk (Sektnan et al., 2010). This demonstrates that higher self-regulation predicted higher academic achievement regardless of whether children are from low-income families or are ELLs. These results, although non-significant, are important because they help to specify the ecological contexts (e.g, low-income and being of ELL status) that do not minimize the predictive effects of self-regulation. In other words, efforts to promote self-regulation in young children may be beneficial for the academic achievement of all children, regardless of the level of risks they are experiencing. As developmental scientists uncover universal points of leverage such as self-regulation, interventionists will better understand how to support the increasingly diverse array of children in U.S. early care and education settings.

Results also suggest that self-regulation may be a key asset that cuts across socio-demographic boundaries and remains predictive of developmental outcomes regardless of these risk factors. Self-regulation may significantly predict academic achievement because it captures the core cognitive components that are malleable yet also underlie successful behavior in our society. These skills help children be successful in structured academic settings, which characterize many of today's classrooms. As educators struggle to tailor instruction to the

children and contexts being served, skills that have cross-cutting power to support school readiness regardless of sociodemographic characteristics are particularly noteworthy.

Limitations

The present study revealed substantive relations between personal assets and demographic risks and early academic achievement. There were, however, a number of limitations that must be noted. First, the sample size was relatively small, which could have limited our ability to detect significant effects including significant interactions. Although other research examining moderator relations with larger samples has yielded similar results (Raver et al., 2007), it is important to replicate the results from the present study with a larger sample of children. Second, we utilized ELL status and being from a low-income family as indicators of demographic risk factors. Similarly, we used self-regulation to index a personal asset. However, there are many other factors (quality of the home environment and parenting, income-to-needs ratio, maternal depression, community-level variables) that comprise risks and assets, which would be important to include. Future research should include a broader set of factors to better conceptualize personal assets and demographic risks.

Practical Implications

The present study suggests that personal assets such as strong child self-regulation are related to children's early academic achievement between preschool and kindergarten. Results were especially strong for children's math, suggesting that these assets can help offset the negative effects of demographic risk on math achievement in the fall of prekindergarten and during the transition to kindergarten. Results of several interventions targeting both social-emotional and self-regulation skills have significantly improved children's early achievement skills (Raver et al., 2011). For example, children in one intervention, called Head Start REDI,

demonstrated stronger social behavior, vocabulary and early literacy skills than children in a control group (Bierman et al., 2008). Children in another intervention using classroom games that helped children practice attention, working memory, and inhibitory control, showed significant improvements in self-regulation for children initially low in these skills and gains in early literacy skills for all children in the intervention (Tominey & McClelland, 2011).

A second implication is that the personal assets and demographic risks had the strongest effects at the fall of prekindergarten, although this may be because relations were concurrent rather than longitudinal. However, it may also suggest that it is important to strengthen assets and minimize risks as early as possible, which parallels research documenting the early childhood period as a sensitive period for early learning and the development of self-regulation (Zelazo et al., 2008). Results demonstrate that children who were of ELL status or from low-income families were developing at a similar rate of their non-at-risk peers. This finding may suggest that experiences in preschool and kindergarten were beneficial for all children regardless of their initial levels or risk factors, which could be due to the relatively high quality preschools in the sample (all were NAEYC accredited). However, at-risk children were also not demonstrating enough gains to catch up to their more advantaged peers. Thus, targeting personal assets such as self-regulation early in a child's life is vital for intervention and policy efforts.

Finally, children's demographic risk factors negatively predicted lower vocabulary skills, and these relations were not offset by strong self-regulation. It may be important to focus on children who are ELLs and from low-income families in interventions to minimize the negative effect these risk factors have on children's vocabulary development (Hart & Risley, 1995).

Conclusions

The present study examined relations between personal assets and demographic risks on children's academic achievement between preschool and kindergarten. Children's self-regulation was significantly related to stronger achievement in the fall of prekindergarten. Being from a low-income family or of ELL status was significantly and negatively related to lower academic achievement. Results underscore the influence of assets and risks on children's early academic performance and highlight the universal importance of self-regulation for children experiencing different risk factors.

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Table 1

Descriptive Statistics and Correlations for Assets, Risks, and Academic Achievement (N=134).

	M (SD)	1	2	3
1. HTT[a]	8.28 (7.60)	---		
2. Low-Income[b]	.46 (.50)	-.29**	---	
3. ELL[b]	.19 (.39)	-.20*	.51***	---
4. Math 1	410.86 (21.89)	.54***	-.33***	-.46***
5. Math 2	424.50 (19.01)	.39***	-.37***	-.48***
6. Math 3	437.13 (17.66)	.46***	-.22	-.40**
7. Math 4	447.52 (20.35)	.31**	-.44***	-.43***
8. Reading T1	341.54 (25.73)	.33***	-.32***	-.07
9. Reading T2	356.89 (29.79)	.29**	-.30**	-.11
10. Reading T3	380.03 (38.88)	.06	.04	.07
11. Reading T4	410.47 (38.06)	.22*	-.18	.07
12. Vocabulary T1	464.79 (16.03)	.35***	-.51***	-.63***
13. Vocabulary T2	470.47 (15.68)	.41***	-.50***	-.66***
14. Vocabulary T3	474.27 (18.86)	.29*	-.41**	-.69***
15. Vocabulary T4	482.43 (16.25)	.33**	-.37**	-.45***

Note. Two tailed p-values.

[a]Head-to-Toes task of self- regulation ranges from 1-20. [b](1=yes, 0=no).

*$p < .05$, **$p < .01$, ***$p < .001$.

Table 2

The Influence of Self-Regulation on Academic Development (N = 134)

		Mathematics	Reading	Vocabulary
Intercept				
Child Age[a]	B	1.81***	.85	.80[t]
	PSD	.57	.66	.39
Gender[b]	B	-.70	2.25	-1.97
	PSD	1.95	2.79	1.49
Mother's Education[c]	B	-.80	.29	.32
	PSD	.54	.75	.43
Low-Income Family[d]	B	-3.47	-8.58**	-6.01**
	PSD	2.57	2.93	2.31
ELL[d]	B	-11.81***	1.29	-10.29***
	PSD	2.24	3.49	1.56
Initial HTT[e]	B	1.25***	.66*	.26
	PSD	.22	.31	.17
Slope				
Child Age[a]	B	-.22	.47[t]	-.05
	PSD	.19	.28	.14
Gender[b]	B	.56	-1.77	.19
	PSD	.66	1.19	.55
Mother's Education[c]	B	.35[t]	.02	.01
	PSD	.19	.34	.16
Low-Income Family[d]	B	-.02	-2.05	.45
	PSD	.95	1.36	.85
ELL[d]	B	1.26	2.55	.98
	PSD	.69	1.48	.60
Initial HTT[e]	B	-.18*	.05	.07
	PSD	.08	.14	.06

Note. Two tailed p-values are reported. B is the unstandardized coefficient. PSD is the Posterior Standard Deviation.

[a]Measured in months. [b](1=boys, 0=girls). [c]Measured in years. [d](1=yes, 0=no). [e]Head-to-Toes task of self- regulation ranges from 1-20.

[t]p <.10. *p < .05. **p < .01. ***p < .001.

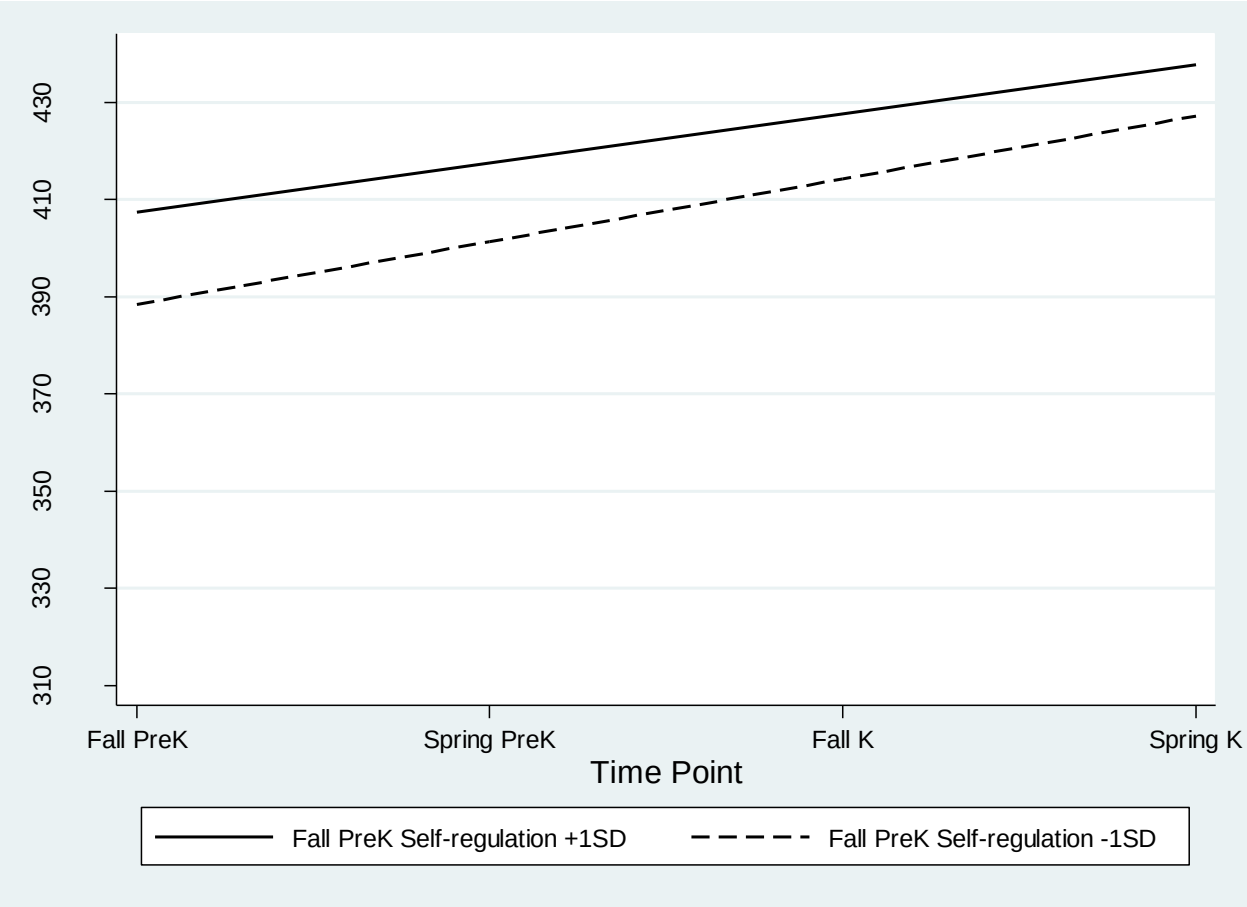

Figure 1. Development of math over time by prekindergarten self-regulation level. Math scores are estimated over the four time points controlling for all covariates (child age, gender, maternal education level, low-income status, and ELL status).

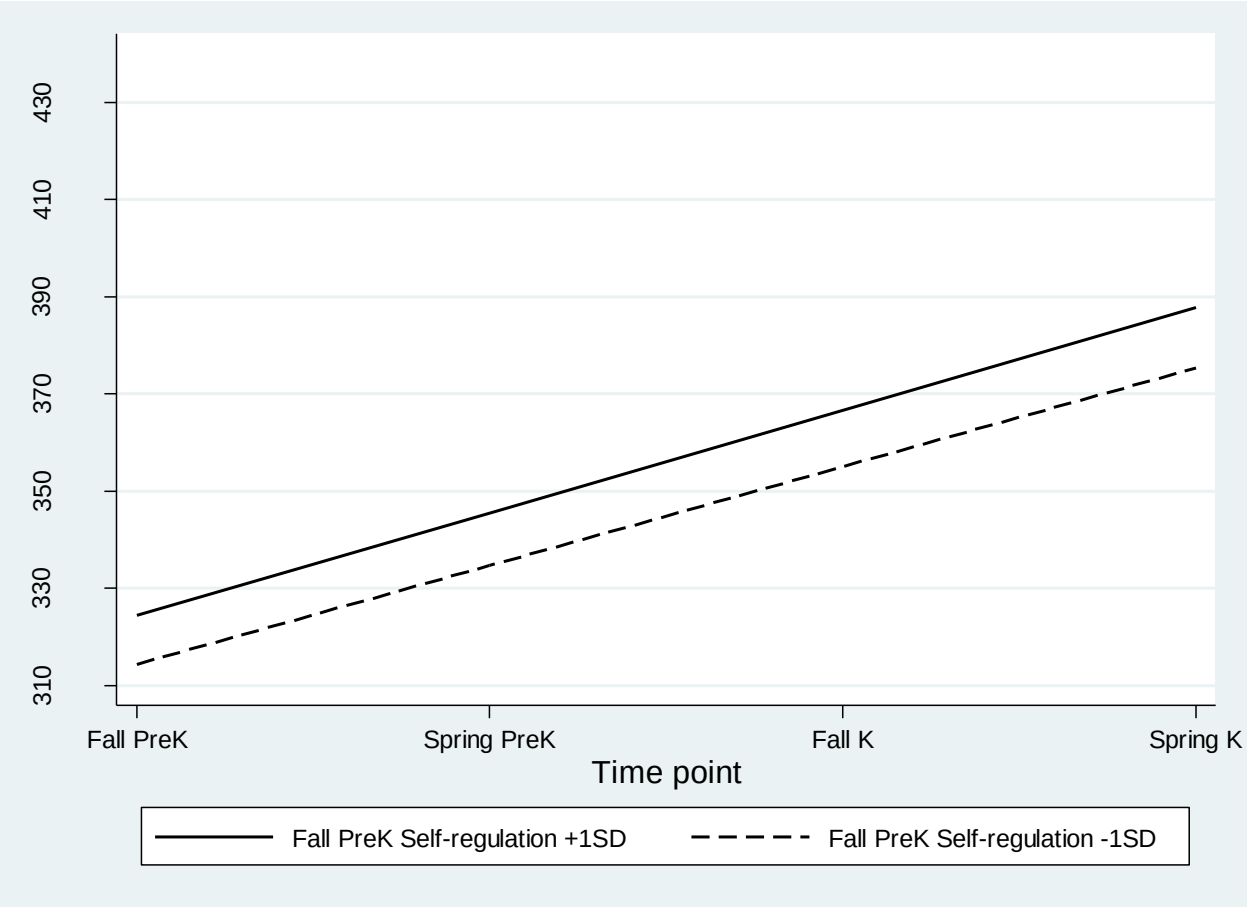

Figure 2. Development of reading over time by prekindergarten self-regulation level. Reading scores are estimated over the four time points controlling for all covariates (child age, gender, maternal education level, low-income status, and ELL status).