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Differential Impact of a Universal Prevention Program on Academic Self-Efficacy: The Moderating Role of Baseline Self-Control

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Abstract

Self-control (SC) plays a critical role in development across the life course; poor SC is a common antecedent of outcomes with high public health and societal burden including lower educational and occupational attainment, problem substance use, depression, obesity, and antisocial behavior. Further, SC is associated with academic self-efficacy and academic success; therefore, optimizing SC in early childhood could have long-term health and educational implications. However, it remains unknown whether the impact of early childhood prevention programs varies by baseline levels of SC, and whether better SC in early childhood leads to better self-efficacy in adolescence. This study leverages a sample of predominately low-/middle-income Black participants (n=678) who were part of a randomized universal preventive trial in first grade (1993–95). Teacher-reported SC was measured at baseline. Utilizing a three-step latent transition analysis, transitions between SC classes and academic self-efficacy trajectories were explored. Intervention status was explored as a predictor of the transition. Results suggest that teacher-rated SC in early childhood predicts academic self-efficacy up to 11 years later. Moderation analyses suggest that there are individual differences in prevention program effectiveness by baseline behavioral regulation skills. Implications for school-based universal prevention programming having an impact on low risk children and methods for exploring moderation within a prevention context are discussed.

This study leverages an existing longitudinal preventive intervention trial to advance fundamental understandings of the development and malleability of adaptive behavior and academic success. Self-control is the ability to focus attention, override impulses,

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Compliance with Ethical Standards

Conflict of Interest. The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in the current study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study. The study was approved by the Johns Hopkins Bloomberg School of Public Health IRB.

and regulate emotions-- key developmental tasks of childhood (Moffitt et al., 2011). Poor self-control in childhood is a common antecedent of outcomes with high public health and societal burden including problem substance use, depression, obesity, and antisocial behavior (Datar & Chung, 2018; de Ritter et al., 2012). In a seminal longitudinal study of children in New Zealand, Moffitt and colleagues (2011) found that self-control measured between the ages of 3 and 11 was linearly related to better health, higher income, less substance use and less interaction with the criminal justice system at age 32. Moreover, a number of studies have found that poorer self-control is related to lower academic performance (i.e., course grades), standardized test performance, and educational achievement (Duckworth et al., 2019). Despite the potential public health and educational importance of efforts to optimize self-control in early life, critical gaps in our knowledge remain, including the role of early childhood behavioral regulation in trajectories of academic engagement and success into adolescence.

Academic success requires self-control to persist in the face of challenges and to organize one's time and schoolwork. One specific mechanism through which self-control may influence academic outcomes is by improving academic self-efficacy. Academic self-efficacy reflects the extent to which individuals believe they can influence their own learning and perceived cognitive competence as it applies specifically to schoolwork (Caprara et al., 2011; Harter, 1988). Several studies have confirmed the relationship between academic self-efficacy and a variety of dimensions of academic achievement and success. For example, self-efficacy beliefs have been linked to course selection in middle school (Britner & Pajares, 2006), academic plans and continuance and standardized test scores in middle and high school (Bandura et al., 2001), and grade point average in college (Robbins et al., 2004). There is some evidence that academic self-efficacy plays a critical part in shaping children's life course trajectories. For example, in a study of 11- to 15-year-olds in Italy, Bandura et. al found that academic self-efficacy played an important part in the occupations for which adolescents saw themselves as well-suited and competent. Moreover, perceived self-efficacy was a better predictor of their choice of occupational path than their actual academic performance (Bandura et al., 2001). Individual differences in self-control have been associated with academic self-efficacy, sometimes in surprising ways. For example, a study by Hoza and colleagues (2004) suggests that children with attention deficit hyperactivity disorder (ADHD), have higher academic self-efficacy compared to parent or teacher reports of their academic performance despite the regulatory challenges typically associated with the condition. This overestimation tends to be greater in areas where children struggle the most.

To date, the precursors of academic self-efficacy have not been well described. While some research has suggested that self-reported academic self-efficacy (and self-worth more broadly) is highly heritable, there is evidence to suggest that it is malleable to early intervention (McGuire et al., 1994, 1999). For example, in a small longitudinal study, Campbell and colleagues (2002) explored whether an early childhood intervention could significantly impact academic self-efficacy in a sample of Black adolescents from under-resourced communities. Adolescents who received an early childhood education intervention were more likely to have higher academic self-efficacy compared to those who did not receive the intervention (Campbell, Pungello, and Miller-Johnson, 2002). Thus, while there

may be heritable components to self-efficacy, some aspects remain malleable and responsive to early childhood programming.

Current Study

The current study explores the longitudinal relationship between self-control and academic self-efficacy in a sample of low/middle-income children who received a universal intervention in early childhood, most of whom identify as Black. Prior work exploring the impact of the intervention, which targeted aggressive and disruptive behavior, has suggested differential impacts based on baseline behavior, such that those with higher levels of problem behavior showed the greatest gains post-intervention (Petras et al., 2011). Therefore, we hypothesize that, within a latent transition framework, intervention status will significantly impact the transition between baseline self-control and academic self-efficacy, such that children with deficits in self-control who receive the intervention will show positive academic self-efficacy as compared to those who did not receive the intervention. The results from this study could have implications for the implementation of universal classroom- and family-based interventions in early childhood, as well as adding to knowledge about the mechanisms through which universal prevention programming has longitudinal impacts on child development.

Method

Participants

Data for this study come from a randomized controlled trial (RCT) with longitudinal follow-up designed to test the impact of two school-based universal preventive interventions. The study began in 1993 with the randomization of 678 first graders and their caregivers to one of two interventions or a control condition. Randomization was accomplished utilizing a randomized block design with schools serving as the blocking factor to assure balanced groups. First, children and teachers were randomly assigned to classrooms within their block (i.e., school) and then the classrooms were randomly assigned to a condition. Thus, each block (school) had all conditions represented within it. Consistent with standard mixed effects or hierarchical modeling, analysis for this study occurred at the student level, taking the clustering of children within classroom and school into account (Stapleton et al., 2016). The interventions were provided over the first-grade year only, following a baseline assessment in the early fall. Data were collected from teacher, parent and child interviews.

Of the original 678 participants, 53.2% were male, 86.8% were Black, and 13.2% were white. Additionally, 63.4% of the participants qualified for free or reduced-price lunch (Ensminger et al., 2000). At baseline, students were 5.3 to 7.7 years old (mean 6.2, $SD \pm .34$). Assessments were carried out in the fall of grade 1, with annual follow-up assessments in the spring of grades 6 through 12. There was modest attrition across the study period but 93.8% of the original sample was included in the current analysis by leveraging full information maximum likelihood (see below). To determine if data was missing at random, we explored whether demographics differed significantly between those in the analysis and those excluded because of missing data. Those whose data were included in the analyses did not differ significantly in terms of baseline demographic characteristics (i.e., sex, free

or reduced lunch status, family adversity) except for race. Black participants, as compared to white participants were more likely to be included in the analysis ($\chi^2(1)=7.10, p<.001$). This research was approved by the Institutional Review Board of the Johns Hopkins Bloomberg School of Public Health. Parental consent and youth assent were obtained for minor youth; at age 18, participants provided consent for themselves. For additional information on the design of the trial, see Ialongo and colleagues (1999), or Ialongo and colleagues (2001).

Interventions

The classroom-centered intervention targeted early risk behaviors related to poor achievement and aggressive behaviors by enhancing the curriculum and providing teachers with improved classroom behavior management strategies, and specific strategies for children not performing adequately (Ialongo et al. 1999). The primary behavior management strategy used was a behaviorally focused classroom management program called the Good Behavior Game (GBG), a strategy that engages the whole class to decrease disruptive behaviors during specific periods during the school day. GBG has demonstrated significant improvements in both proximal and distal student behavior (Embry, 2002). GBG is a whole-classroom management strategy that promotes on task time and discourages disruptive behavior by creating heterogeneous groups that work together to obtain points for on-task behavior. Students are able to use their points for tangible rewards such as classroom activities or stickers.

Like the classroom-centered intervention, the family-school partnership intervention targeted poor achievement and aggressive behaviors. The family-school partnership intervention sought to reduce these early risk behaviors by improving the relationship between parents and teachers by enhancing communication and providing parents with effective child behavior management strategies. This was accomplished through training for teachers and staff in parent-teacher communication and partnership building, home-school learning and communication activities for parents and students, and workshops for parents on supporting child academic development and prosocial behavior led by the first-grade teacher and the school psychologist or social worker. Parent workshops focused on 1) the importance of reading aloud; 2) fun math activities; and 3) effective disciplinary strategies (based on the *Parents and Children* series by (Webster-Stratton, 1984). A voicemail system was also developed for members of the family-school partnership group to sustain parent involvement and facilitate parent-teacher communication around the child's behavior.

Based on fidelity measures, five of the nine classroom-centered intervention classrooms were identified as high-implementation classrooms. In the family-school partnership intervention, parents attended close to 60% of the parent workshops and a similar proportion completed of the read aloud and fun math activities (~61% completion of 64 activities provided). More information about intervention implementation and participation across both programs can be found in Ialongo and colleagues (1999). The current analysis relies on an intent to treat approach including all subjects randomized, irrespective of engagement with program activities.

Measures

Self-Control (SC).—SC was assessed by classroom teachers in the fall of first grade using 12 items from the Teacher Observation of Classroom Adaptation-Revised (TOCA-R; Werthamer-Larsson et al., 1991). The TOCA-R assesses the frequency of cognitive and behavioral inhibition, attention, task engagement, and hyperactivity on a 6-point Likert scale from almost never (1) to always (6). The TOCA-R had good test-retest reliability over four months with different interviewers (0.60 or higher) and alphas for each subscale ranged from 0.78 to 0.94. Items to use during this analysis were captured from the concentration problems (four out of eleven items included), hyperactivity (three out of three items included), and impulsivity (one out of three items included) subscales and focused on those items that directly map on to SC behavior. Items include: concentrates, pays attention, stays on task, waits for turn, easily distracted, can't sit still, out of seat/runs around, always on the go/acts as if driven by a motor.

Academic Self-Efficacy (ASE).

Academic self-efficacy was measured utilizing the self-perception profiles for adolescents (SPPA; Harter, 1988) and administered in grades 6–12. The domains included Academic Self-Efficacy, Social Acceptance, Athletic Competence, Physical Appearance, Behavioral Conduct, Romantic Appeal, and Close Friendship. Academic Self-Efficacy was calculated with four items such that higher scores are indicative of greater efficacy, Cronbach's alphas ranged from 0.649 to 0.725 across the study period.

Data Analysis Plan

The model building process began with the specification of two latent mixture models. First, a latent profile analysis (LPA) was conducted with pre-intervention baseline teacher reported SC measures from the fall of first grade. Then, class enumeration for the growth mixture model (GMM) with academic self-efficacy was modeled, comparing several different specifications, before finalizing the model and running it with covariates. As is the case of many longitudinal studies, we had some missingness due to attrition, we followed current research standards and utilized full information maximum likelihood during model estimation (Schafer & Graham, 2002). This type of estimation adjusts the parameter estimates using all information available.

Class enumeration.—Class enumeration was conducted separately for each latent class (LPA and GMM). We used fit statistics (i.e., Bayesian information criterion (BIC), the Lo Mendell–Rubin (LMR) test alongside substantive interpretation when decided on the number of classes.

Three-step method in *Mplus*.—While the inclusion of covariates is possible using the automatic methodology implemented in *Mplus* (i.e., auxiliary commands; Asparouhov & Muthén, 2014), specifying a latent transition analysis (LTA) model requires the use of three-step methods. We use the three-step method within the LTA framework where the latent class variables are not repeated measures, but instead come from two separate latent models to describe associations between first grade self-control and academic self-efficacy trajectories in grades 6–12 (Nylund-Gibson et al., 2014). This method requires several

model runs for each portion of the LTA model. First, the three-step specification is done with the LPA model. This involves running the final unconditional model after class enumeration, saving posterior class probabilities and most likely class assignment, and fitting an LPA model with that information. The same process is repeated for the GMM. The final LTA model specification is created by combining the third step from the LPA model and GMM with the GMM is regressed on the LPA variable. For more information, including *Mplus* code, see Nylund-Gibson et al., 2014 (see Figure 1).

Results

Descriptive statistics

Table 1 summarizes means and standard deviations for teacher-reported SC items, academic self-efficacy, and key covariates (sex and race). The sample was 55.1% male, and most children were Black (85.3%). Intervention status was evenly divided, by design, among the classroom-centered intervention (31.9%), the family-school partnership (33.6%), and the control condition (34.5%). The least common teacher-reported behavior was “out of seat/runs around,” and the most common teacher reported behavior was “waits for turn.” On average, academic self-efficacy increased slightly from grades 6 through 12.

Self-Control LPA

The SC class enumeration (see Table 2) process resulted in fit statistics supporting the use of a three-class model, including the BIC with a clear elbow in the three-class model. The three-class model resulted in distinct and interpretable classes (Johnson et al., under review, see Figure 2). The high SC class ($n = 323$, 48.1%), had low probabilities of SC problems like being easily distracted and high probabilities of behaviors characteristic of high SC such as staying on task. The inattentive class ($n = 237$, 35.3%), had moderate probabilities of more inattentive SC problems like mind wandering or being easily distracted, but lower probabilities of hyperactive SC behaviors such as running around or blurting out answers. The inattentive/hyperactive class ($n = 112$, 16.6%), demonstrated the highest probabilities of SC problems on both inattentive and hyperactive dimensions. Two important covariates were explored as predictors of SC latent profile membership. Males were significantly more likely to be in the inattentive class (OR: 1.62) and inattentive/hyperactive SC class (OR: 4.05) as compared to the high SC class. Further, males were more likely to be in the inattentive/hyperactive SC class as compared to the inattentive class (OR: 2.49). Black participants were more likely to be in the inattentive class as compared to the high SC class (OR: 1.93). No other pairwise comparisons were statistically significant for sex or race.

Academic Self-Efficacy GMM

A series of growth mixture models were fit using academic self-efficacy scores from 6th through 12th grade. Based on fit statistics, including the Lo-Mendell-Rubin likelihood ratio test (see Table 2), a three-class model was chosen (see Figure 3). The largest class (61%), which we call high-increasing academic self-efficacy, had a high mean intercept (3.5) and a statistically significant positive slope (0.049, $p < .001$). The second largest class (30%), which we call increasing academic self-efficacy had a mean intercept of 2.5 and a statistically significant positive slope (0.133, $p < .001$) such that the trajectory neared the high-increasing

trajectory at the last timepoint. Finally, the smallest class (9%), which we call gradual decreasing academic self-efficacy, had an intercept similar to the increasing trajectory (2.48) and a marginally significant negative slope (-0.062 , $p=0.043$). Key covariates were explored as predictors of class membership. Black participants were significantly more likely to be in the increasing class (OR: 4.03) and the high increasing class (OR: 4.86) as compared to the gradual decreasing class. No other covariates were significant predictors of class membership.

Results of combined LTA model

A combined LTA model was run using the specifications developed in the third step of the LPA and GMM models. An unconditional LTA model was run first, to ensure correct specification, and then the final model with covariates was fit. Transition probabilities (see Table 3) describe how children transitioned from SC classes in first grade to academic self-efficacy trajectories beginning in 6th grade. The results indicate that children in the inattentive/hyperactive class had a 0.15 probability of transitioning into the gradual decreasing trajectory class and a 0.49 probability of transitioning into the high-increasing class; in other words, 15% of the children in the inattentive/hyperactive class transitioned to the gradual decreasing self-efficacy trajectory class while 49% of children transitioned to the high-increasing self-efficacy trajectory. It was unlikely (e.g., low probability) that children in the high SC class transitioned to the gradual decreasing self-efficacy class (probability = 0.05). Most (67%) of the children in the high SC class transitioned to the high increasing self-efficacy trajectory class. Over half (56%) of children in the inattentive class transitioned to the high increasing self-efficacy trajectory. The remaining unconditional transition probabilities can be found in Table 3.

Covariate results of the final LTA model

The final LTA model evaluated the influence of key covariates as well as an interaction term that allowed the transition probabilities to vary by intervention status (see Tables 4 and 5). The high SC class served as a reference for the SC profiles and the high-increasing trajectory served as a reference for the academic self-efficacy model. A summary of the key findings follows.

The impact of covariates in the final LTA (Table 4) was consistent with the findings from the independent LPA and GMM models. Overall, sex was a significant predictor of SC class membership. Males were more likely to be in the inattentive or inattentive/hyperactive classes compared to the high SC class (OR: 1.59, $p = .013$ and OR: 3.94, $p < .001$, respectively). Race was unrelated to children's SC class. However, race was a significant predictor for academic self-efficacy trajectories. Black participants were more likely to be in the high-increasing and increasing trajectories as compared to the gradual decreasing trajectory (OR: 4.86 and OR: 4.03, $ps < .001$, respectively). Sex was unrelated to children's academic self-efficacy trajectories (see Table 4).

Interaction results.—The interaction term for intervention status (family or classroom interventions vs. control) tested whether intervention status changed the probability of a child transitioning between the first-grade self-control classes and academic self-

efficacy trajectories in grades 6–12. For children in the inattentive/hyperactive class, there was an interaction for intervention status for one of the transitions (see Table 5). Specifically, children in the inattentive/hyperactive class who received the classroom-centered intervention were more likely to transition to the increasing academic self-efficacy trajectory relative to the high-increasing trajectory (OR: 6.22, $p=0.037$). The findings were qualitatively similar, although not statistically significant, for children in the inattentive/hyperactive class who received the family-school partnership intervention (OR: 4.20, $p=0.098$).

Children in the inattentive class who received either intervention were less likely to transition to the mildly decreasing academic self-efficacy trajectory as compared to the high-increasing trajectory (classroom-centered: OR:0.33, $p=0.086$; family-school partnership: OR:0.24, $p=0.036$). Finally, children who were in the high SC class and received the classroom-centered intervention were significantly less likely to transition to the increasing academic self-efficacy trajectory as compared to the high-increasing trajectory (OR: 0.31, $p=0.015$). Intervention status did not influence the transition probabilities for children in the inattentive/hyperactive class who transitioned to the gradual decreasing self-efficacy trajectory, children in the inattentive class who transitioned to the increasing academic self-efficacy trajectory or for children in the high SC class who transitioned to the gradual decreasing self-efficacy trajectory.

Discussion

SC is an important and malleable factor related to important adult outcomes (Moffitt et al., 2011). Here we demonstrate that SC in early childhood, as reported by teachers, is significantly predictive of an individual's academic self-efficacy up to 11 years later. More specifically, young children who had high teacher-reported SC in the fall of first grade had a high probability of transitioning to a high, increasing academic self-efficacy trajectory between 6th and 12 grades, whereas children rated as having both inattentive and hyperactive threats to SC were less likely to transition to the higher academic self-efficacy trajectories. In fact, children in this group had the highest probability of transitioning to the decreasing academic self-efficacy trajectory by grade 12. The endpoint of students' trajectories in high school could have important implications for college and career. In a small study of non-traditional immigrant and racial/ethnic minority college students, academic self-efficacy was a robust predictor of academic performance and retention in the first year (Zajacova et al., 2005). Thus, factors early in development that influence these trajectories are potentially critical intervention targets with long-term implications.

This study explored whether an early childhood universal prevention program moderated the transition between SC profiles and ASE trajectories. The interventions were designed to target aggressive and disruptive behaviors in childhood through classroom management and improving parent-teacher relationships. Prior work has demonstrated that not only was the prevention program successful at reducing proximal aggressive and disruptive behaviors, but the program impacted other proximal and distal targets (Embry, 2002; Ialongo et al., 1999). No study to date, however, has explored whether this universal prevention program significantly impacted long-term academic self-efficacy, years after the program

was implemented. The current study extends previous work by Ialongo and colleagues (1999) by demonstrating that children with high SC and low disruptive behavior at baseline are also receiving benefits from the intervention but in ways not originally anticipated. Thus, these findings suggest that prevention researchers should explore how programs and baseline characteristics (both assets and vulnerabilities) interact to impact distal outcomes beyond the scope of initial intervention outcomes.

There are several theoretical frameworks that support the supposition that an early childhood prevention program may have long-term or distal impacts. Taken together, the life course/ social fields perspective and Patterson and colleagues' social cognitive learning theory model of the development of antisocial behavior (Granic & Patterson, 2006) provides a theoretical basis for understanding the mechanisms through which preventive interventions may impact behavior across the life course. Patterson and colleagues (2006) theorize that the failure to develop social survival skills reduces opportunities for obtaining positive reinforcement from mainstream natural raters—such as parents, teachers, and well-adjusted peers (Granic & Patterson, 2006). Lack of positive reinforcement may significantly impact children's self-worth and self-efficacy in the long term. Relatedly, the lack of positive reinforcement received from mainstream natural raters may lead to decrements in psychological well-being in the form of anxiety and depression (Kim et al., 2009). Deficits in self-efficacy may lead to further decrements in psychological well-being (Capaldi, 1991) and undermine success in the educational and work.

Limitations

This study contributes to the literature supporting the use of universal prevention programming; however, the results should be considered in light of several limitations. First, there is the potential for unmeasured confounding. In this sample of primarily Black students, one cannot ignore the impact that structural racism and socioeconomic marginalization, as well as racial socialization have on the developmental life-course of individuals (Coll et al., 1996). While the current study is underpowered to test differences by race, data harmonization efforts could be useful to explore the role that institutional racism and racial socialization play has in the development of academic self-efficacy among Black children. Second, it is important to acknowledge that this study began in 1993 when the children were entering first grade. Social and academic contexts are different among similar-aged students today. Nonetheless, the importance of SC in academic success remains high and that the classroom environment has not changed so dramatically that these results cannot be generalized to elementary school-aged children today. We believe that there is significant value in exploring the long-term impacts of early prevention programming. Finally, the analytic models used in the present analyses are complex and statistical power is limited by the sizes of the cells. Replication of these findings is as important as extending this work to add support to the growing literature surrounding the development and promotion of self-control across the life-course.

Conclusions and Implications

As prevention researchers move toward the development of precision integrated prevention programming with universal, selected, and indicated programs adapted to impact subgroups of interest, we need analytic approaches that allow us to appropriately model heterogeneity in prevention impacts seated within life course perspectives. Moreover, the analytic model used in this study provides a useful and simple method to explore moderation using longitudinal latent modeling that is broadly applicable beyond the study of SC and academic self-efficacy.

This study has demonstrated that SC, a baseline target, and a universal prevention program interact to predict the trajectory of academic self-efficacy in life course development. Further, while much of the previous literature exploring the impact of the Good Behavior Game has focused on the subgroup of individuals characterized by SC deficits, here we show that individuals with comparatively high SC (characterized by attentive and on-task behavior at baseline) also benefit from a prevention program targeted toward behavioral domains in which they are already demonstrating competence. While we often believe that those who are skilled in the behaviors that are targeted in a universal prevention program are likely to not significantly benefit from the program, this study suggests that further research among those low-risk children is necessary. Future work should explore mechanisms by which high SC confers benefit and explore other baseline assets.

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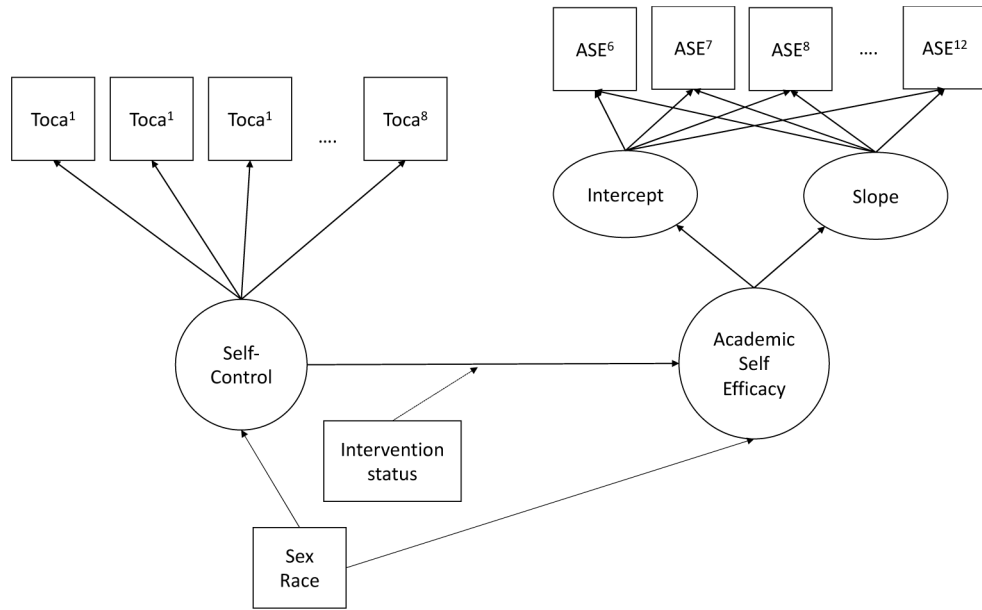


Figure 1. Final latent transition analysis model modeling the transitions between self-control classes to academic self-efficacy trajectories controlling for sex and race.
Note. TOCA = Teacher observation of classroom adaptation; ASE = Academic Self-Efficacy

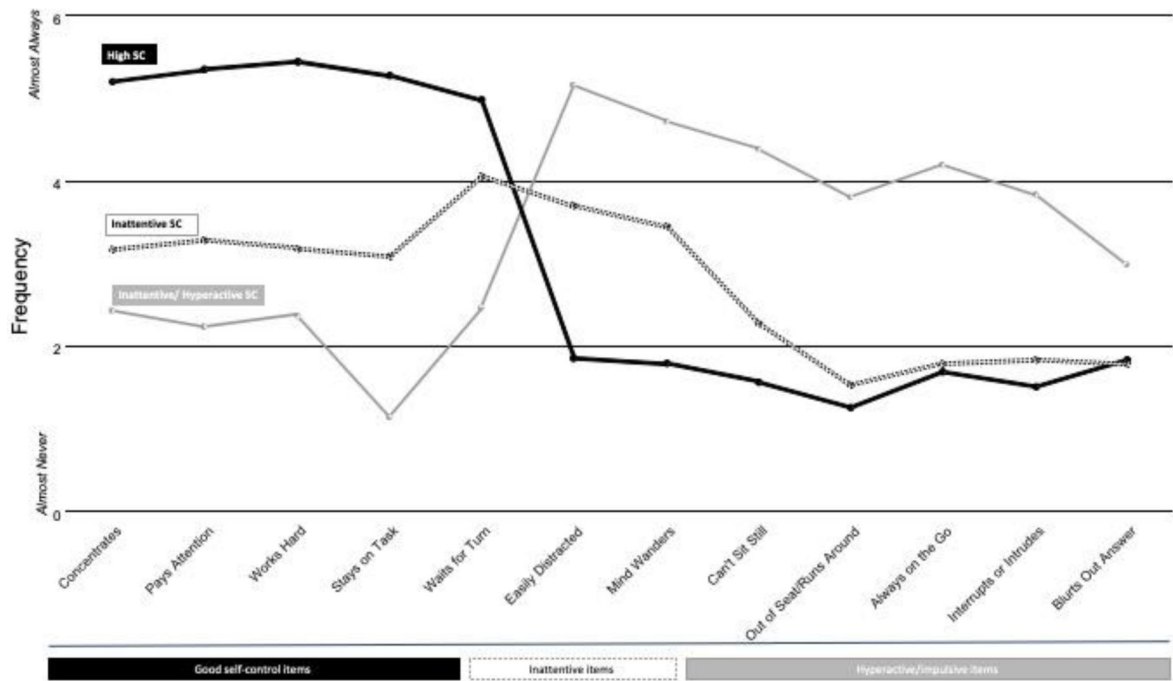


Figure 2.
Item probability plot for the latent class analysis ($c=3$) of Self-Control in the fall of first grade.

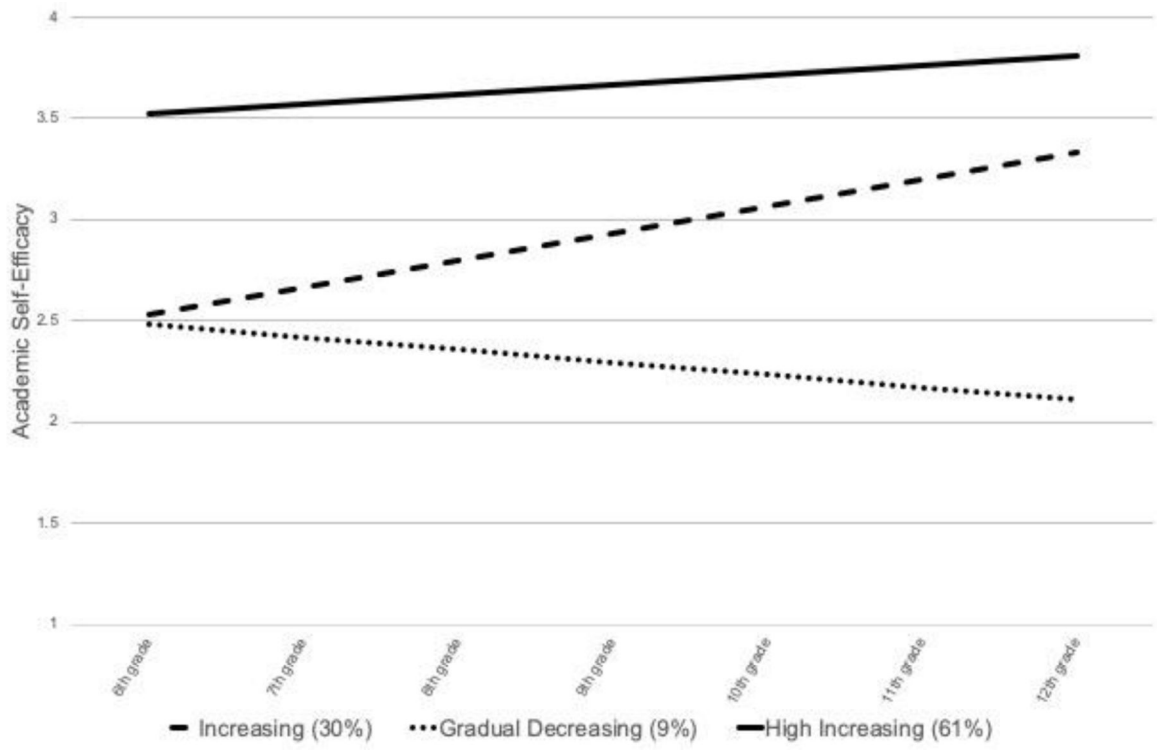


Figure 3. Latent trajectories of scholastic competence from 6th grade to 12th grade resulting from the growth mixture model (c=3)

Table 1.

Descriptive statistics

Variables	M (SD)
<i>Self-Control Items</i>	
Concentrates	4.00 (1.5)
Pays attention	4.08 (1.5)
Works Hard	4.11 (1.5)
Stays on Task	3.96 (1.6)
Waits for Turn	4.21 (1.53)
Easily Distracted	3.08 (1.64)
Mind Wanders	2.89 (1.54)
Can't sit still	2.33 (1.57)
Out of seat, runs around	1.80 (1.27)
Always on the go	2.17 (1.52)
Interrupts or intrudes on others	2.04 (1.30)
Blurts out answer	2.02 (1.28)
<i>Scholastic Competence</i>	
Academic Self-Efficacy 6 th grade	3.01 (0.77)
Academic Self-Efficacy 7 th grade	3.20 (0.75)
Academic Self-Efficacy 8 th grade	3.30 (0.68)
Academic Self-Efficacy 9 th grade	3.38 (0.65)
Academic Self-Efficacy 10 th grade	3.41 (0.66)
Academic Self-Efficacy 11 th grade	3.47 (0.61)
Academic Self-Efficacy 12 th grade	3.50 (0.61)
<i>Covariates</i>	
Sex (male)	55.1%
Race (Black)	85.3%
<i>Intervention Status</i>	
Classroom-centered	31.9%
Family-school partnership	33.6%
Control	34.5%

Table 2.

Fit statistics for self-control latent profile analysis (LPA) and scholastic competence general growth mixture model (GMM).

No. of Classes	Log Likelihood	BIC	LMR p-value	Entropy	Smallest Class
Self-Control LPA					
1	-14707.09	29570.63	na	na	na
2	-12972.27	26185.75	<.001	0.951	46% (308)
3	-12326.07	24978.10	0.0027	0.939	16% (108)
4	-12064.35	24539.40	0.0878	0.090	14% (96)
5	-11837.07	24169.59	0.2335	0.913	12% (78)
Academic Self-Efficacy GMM					
1	-4179.02	8417.19	na	na	na
2	-3547.27	7173.41	<.001	0.843	33% (233)
3	-3390.81	6880.21	0.0023	0.829	9% (65)
4	-3351.55	6821.40	0.3072	0.743	8% (54)
5	-3308.4	6754.85	0.5175	0.749	5% (38)

Table 3.

Latent transition probabilities based on the unconditional latent transition analysis model.

Self-Control Classes	Academic Self-Efficacy Trajectories		
	Increasing	Gradual Decreasing	High-Increasing
Hyperactive/Inattentive Self-Control	0.362	0.148	0.490
Inattentive Self-Control	0.326	0.116	0.558
High Self-Control	0.281	0.051	0.668

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Table 4.

Covariate Table for the Final Model

	Effect	Logit	SE	Logit/SE	p Value	OR
Self-Control Classes *						
Inattentive/ Hyperactive Self-Control	Race (black)	0.226	0.367	0.615	0.538	1.25
	Sex (male)	1.370	0.274	5.00	<.001	3.94
Inattentive Self Control	Race (black)	0.591	0.300	1.970	0.049	1.81
	Sex (male)	0.464	0.186	2.494	0.013	1.59
Academic Self-Efficacy Trajectories *						
Increasing Academic Self-Efficacy	Race (black)	1.395	0.397	3.517	<.001	4.03
	Sex (male)	0.497	0.356	1.395	0.163	1.64
High-Increasing Academic Self-Efficacy	Race (black)	1.581	0.332	4.767	<.001	4.86
	Sex (male)	0.449	0.315	1.426	0.154	1.57

* High Self-Control class and Gradual Decreasing Academic Self-Efficacy class are serving as the reference class.

Table 5.

Interaction Effects of intervention status in the Final Latent Transition Analysis Model.

Self-Control Class	Academic Self-Efficacy Trajectory	Effect	Logit	SE	Logit/SE	p Value	OR
Inattentive/ Hyperactive Self-Control	Increasing Academic Self-Efficacy	Classroom Intervention	1.827	0.876	2.086	0.037	6.22
		Family Intervention	1.435	0.869	1.652	0.098	4.20
	Gradual Decreasing Academic Self-Efficacy	Classroom Intervention	0.016	0.839	0.020	0.984	1.02
		Family Intervention	-0.147	0.841	-0.175	0.861	0.86
Inattentive Self-Control	Increasing Academic Self-Efficacy	Classroom Intervention	0.067	0.479	0.141	0.888	1.07
		Family Intervention	0.051	0.494	0.104	0.917	1.05
	Gradual Decreasing Academic Self-Efficacy	Classroom Intervention	-1.107	0.644	-1.719	0.086	0.33
		Family Intervention	-1.445	0.689	-2.098	0.036	0.24
High Self-Control	Increasing Academic Self-Efficacy	Classroom Intervention	-1.165	0.481	-2.424	0.015	0.31
		Family Intervention	-0.464	0.356	-1.303	0.193	0.63
	Gradual Decreasing Academic Self-Efficacy	Classroom Intervention	1.078	1.361	0.792	0.428	2.94
		Family Intervention	1.044	1.342	0.778	0.436	2.84

* High Increasing Academic Self-Efficacy class serves as the reference class.