

Interactions among Children's Ability to Control Impulsive Behaviors, Academic Motivation, and Academic Performance over Years across Kindergarten and First Grade

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Abstract

This study explored the relationships among children's ability to control impulsive behaviors, academic motivation, and academic performance. Results showed that, as early as when children are in kindergarten and first grade, their ability to control impulsiveness and their academic motivation both positively influence academic performance. However, academic motivation does not mediate between children's ability to control impulsiveness and their academic performance. Different aspects of children's self-concepts (social competence and academic competence) are closely associated with each other, but academic motivation does not influence that association. Data were extracted from a national database—the Early Childhood Longitudinal Study-Kindergarten Class of 1998-99.

Introduction

Modern society is dynamic, and so the vital factors that influence children's growth and development may change from time to time. Children's sense of self also grows and influences how they interact with life stressors such as academic difficulties. When children are about to enter primary school, they begin to outgrow an absolute self-definition (i.e., all-or-nothing) and develop more complex concepts of themselves (Harter, 1998). During this time period, for the first time in children's life, at least four separate self-concepts including academic competence, social competence, physical/athletic competence, and physical appearance begin to form simultaneously (Berk, 2005). However, the extent to which children's academic competence relates to their social competence during this time period has not been well researched. This study explored that issue.

Exploring interactions between children's academic and social competence can help researchers understand whether different aspects of children's selves are closely tied during the two-year period of kindergarten and first grade. In addition, such exploration can help teachers and parents concerned about children's academic performance decide to treat children's social issues separately from academic issues or treat those two issues together.

Although many studies have explored factors that influence children's academic performance, few researchers have longitudinally attended to relationships between children's academic performance and aspects of social performance such as the ability to self-control impulsive behaviors. This study was designed to explore the relationships among children's academic performance, their academic motivation, and their abilities to control impulsive behaviors, during the two-year period of kindergarten and first grade.

Review of Related Literature

As children grow, their developing cognitive skills, biological makeup, and parenting they receive all intertwine in shaping their sense of self (Cook & Cook, 2005). Children with a positive academic sense of self are more willing to try hard and they tend to demonstrate good academic achievement (Berk, 2005). Although challenging tasks may threaten children's self-worth and debilitate their regulation in academic behaviors, resilient children can manage adverse circumstances, regulate their behaviors, and learn from experiences (Midgley, Kaplan, &

Middleton, 2001; Papalia, Olds, & Feldman, 2004). It seems that one factor that helps children bounce back from challenging situations is their ability to control their impulsive behaviors. Therefore, it was hypothesized in this study that children's ability to control impulsive behaviors positively influences their academic performance.

Academic motivation is positively associated with children's academic performance, and it can be either a response to external stimuli or a tendency activated by internal factors (DiPerna, Volpe, & Elliot, 2005). Alexander, Entwisle, and Dauber's (1993) study showed that children's interest in studying (academic motivation) is positively related to their test scores (academic performance). According to Papalia and colleagues (2004), intrinsic motivation seems to be more effective than external motivation in influencing children's behaviors. Therefore, internal-activated motivation was assumed in the present study to positively influence academic performance.

Studies on factors influencing elementary school students' academic performance have had two major limitations: (a) they include fewer subjects than a large-scale national study does and (b) they explored impacts of variables in a shorter time period than a multi-year study does. These two limitations may discourage researchers and educators from confidently generalizing study results to all elementary school students in America. This study addressed both limitations by extracting data from ECLS-K, a longitudinal national database that includes 21260 children who live in different parts of the United States.

Definitions of Variables

This study uses data from the ECLS-K database to investigate interactions between three variables: children's ability to control impulsive behaviors, academic motivation, and academic performance. In this study, children's ability to control impulsive behaviors is defined as their ability to reduce the influence of impulsiveness on their behaviors, and is evidenced by their impulsiveness scores in the ECLS-K database Social Rating Scale (SRS). A lower impulsiveness score thus indicates a greater ability to control impulsive behaviors. Children's academic motivation is defined as children's motivation to engage in academic activities. The ECLS-K database designates this motivation *approaches to learning* in the ECLS-K database and measured it with the SRS. Scores on approaches to learning reflect children's levels of academic motivation, and so higher approaches to learning scores indicate higher levels of academic motivation. Children's academic performance is defined as their achievement in science and social studies. The ECLS-K database used the term *general knowledge* to indicate children's performance in science and social studies, and ECLS-K staff developed a general knowledge test to assess that performance. Higher scores on the test reflect higher levels of general knowledge, or academic performance.

Theoretical Framework

Because this study extracted data from the Early Childhood Longitudinal Study-Kindergarten Class of 1998-99 (ECLS-K), it also followed the ECLS-K's theoretical framework. The ECLS-K framework emphasizes the interactions between the child and family, the child and school, family and school, and family, school, and community. This study also followed Cook and Cook's (2005) suggestion that children's cognitive skills, biological makeup, and parenting they receive intertwine to shape children's sense of self, and children use that sense of self to interact with the world around them.

Based on the ECLS-K framework and Cook and Cook's (2005) suggestion, the researchers of this study assumed that children gradually form an integrated sense of self after they integrate their previous experiences interacting with their environments. With their integrated sense of self, children become able to control their impulsive behaviors and to generate internal academic motivation. The abilities to self-control impulsive behaviors and to self-generate academic motivation were hypothesized in this study to positively impact children's academic performance.

Methodology

Database and Participants

This study's data source, the Early Childhood Longitudinal Study-Kindergarten class of 1998-99 (ECLS-K), is a multisource, multimethod study focused on early school experiences beginning with kindergarten. The ECLS-K has been sponsored by the U. S. Department of Education's National Center for Education Statistics, and follows a national representative cohort from kindergarten through fifth grade. The ECLS-K database includes 21,260 children throughout the U. S.

Extracting Data from ECLS-K Database

The present study did not include all ECLS-K database variables, but did extract three: (a) children's ability to control impulsive behaviors, (b) children's academic motivation (approaches to learning), and (c) children's academic performance (general knowledge). Although the ECLS-K staff continued to track their children from kindergarten through fifth grade, they stopped collecting data regarding children's ability to control impulsiveness after spring semester of the year 2000. Therefore, the present study could only explore interactions among the three variables during kindergarten and first grade. Data were collected at 3 different time points over those two years. Round 1 of data collection was conducted in Fall 1998, Round 2 in Spring 1999, and Round 3 in Spring 2000.

Instruments

Children's ability to control impulsive behaviors and their academic motivation were both assessed by the Social Rating Scale, and children's academic performance was measured by a general knowledge test. The Social Rating Scale was adapted from the Social Skills Rating Scale (Gresham & Elliot, 1990), and the general knowledge test was developed by ECLS-K staff members. Both instruments' reliability and validity were reported in the ECLS-K first grade users' manual (National Center for Education Statistics, 2002).

Hypotheses and Data Analysis

Hypotheses that were tested in the study include:

- (a) Children's ability to control impulsive behaviors can predict their academic motivation across kindergarten and first grade.
- (b) Children's academic motivation can predict their academic performance across kindergarten and first grade.
- (c) A linear combination of children's ability to control impulsive behaviors and their academic motivation can predict their academic performance across kindergarten and first grade.

The three hypotheses were tested by three separate series of regression procedures. Prior to testing the hypotheses, procedures of one-way ANOVA were applied to test whether gender and ethnic background significantly impacted children's academic performance.

Results

Effects of Gender and Ethnic Background on Academic Performance

Gender was found to significantly impact academic performance. However, its effect was not stable across the two-year period. There was no gender difference in academic performance in

Round 1. But in Rounds 2 and 3, male children showed significantly higher levels of academic performance than female children did. Specifically, in Round 2, results of ANOVA showed a difference between males and females, $F(1, 16930) = 9.567$, $p < .001$, $\eta^2 = .001$. Male children showed a mean of 26.052 (SD = 10.058) while female children demonstrated a mean of 25.580 (SD = 9.766). In Round 3, results of ANOVA revealed a difference between the two genders, $F(1, 16630) = 25.146$, $p < .001$, $\eta^2 = .002$. The means for males and females were 33.951 (SD = 9.289) and 33.236 (SD = 9.097), respectively.

The effects of ethnic group on academic performance were found to be significant in each of the 3 rounds. The ECLS-K database categorized their child participants into eight ethnic groups: American Indian, Asian, Black, Hispanic (race not specified), Hispanic (race specified), Native Hawaiian, White (non Hispanic), and more than one race. Two of the groups, namely White and more than one race, respectively demonstrated the highest and the second highest levels of academic performance in each of the 3 rounds.

In Round 1, results of ANOVA showed $F(8, 15699) = 711.968$, $p < .001$, $\eta^2 = .266$. The means of the eight racial groups were 24.732 (White), 22.057 (more than one race), 17.583 (American Indian), 17.103 (Black), 15.584 (Native Hawaiian), 14.546 (Hispanic, race specified), 14.068 (Asian), and 11.421 (Hispanic, race not specified).

In Round 2, results of ANOVA showed $F(8, 16923) = 689.441$, $p < .001$, $\eta^2 = .246$. The means of the eight race groups were 29.860 (White), 27.378 (more than one race), 23.221 (American Indian), 21.761 (Black), 20.629 (Native Hawaiian), 20.146 (Hispanic, race specified), 19.869 (Asian), and 16.818 (Hispanic, race not specified).

In Round 3, results of ANOVA showed $F(8, 16623) = 578.330$, $p < .001$, $\eta^2 = .218$. The means of the eight groups were 37.143 (White), 35.181 (more than one race), 30.862 (American Indian), 29.844 (Asian), 29.567 (Black), 29.346 (Native Hawaiian), 28.471 (Hispanic, race specified), and 25.709 (Hispanic, race not specified).

Results of Hypotheses-Testing

As mentioned earlier, three separate series of multiple regression procedures were applied to test the three hypotheses in the study. All the hypotheses were supported.

In Round 1 (Fall 1998), results showed that children's ability to control impulsiveness could predict academic motivation, $F(1, 14674) = 412.589$, $p < .001$; which in turn, could predict academic performance, $F(1, 15062) = 2418.00$, $p < .001$. In addition, a linear combination of children's ability to control impulsiveness and academic motivation was found to be able to predict academic performance. The sample multiple correlation coefficient (R) was .193, indicating that approximately 3.7% of the variance of academic performance in the sample could be accounted for by the linear combination of children's ability to control impulsiveness and their academic motivation. The R square changes showed that approximately 2.7 % of the variance in academic performance could be accounted for by academic motivation while about 1% of the variance could be accounted for by children's ability to control impulsiveness. The results of this regression analysis are presented in Table I.

In Round 2 (Spring 1999), results of regression analysis were similar to those of round 1. Children's ability to control impulsiveness could predict academic motivation, $F(1, 15786) = 503.888$, $p < .001$, and academic motivation could predict academic performance, $F(1, 16201) = 20642.7$, $p < .001$. A linear combination of children's ability to control impulsiveness and their academic motivation contributed to 3.4 % of the variance in academic performance. Approximately 3.1 % of the variance could be accounted for by academic motivation while about

0.3 % of the variance could be explained by children's ability to control impulsiveness. Table II shows results of this regression analysis.

In Round 3 (Spring 2000), results showed that children's ability to control impulsiveness was an effective predictor of academic motivation, $F(1, 15543) = 506.950$, $p < .001$, and that academic motivation was able to predict academic performance, $F(1, 14945) = 551.005$, $p < .001$. A linear combination of children's ability to control impulsiveness and their academic motivation contributed to 3.8 % of the variance in academic performance. Approximately 3.6 % of the variance could be accounted for by academic motivation while about 0.2 % of the variance could be accounted for by children's ability to control impulsiveness. The results of this regression analysis are presented in Table III.

Table I. Summary of Regression Analyses of Children's Ability to Control Impulsiveness and Academic Motivation Predicting Academic Performance in Round One (Fall 1998)

Variable	B	β	R^2 Change	p
Ability to Control Impulsiveness	.832	.108	.010	.00
Academic Motivation	2.401	.205	.027	.00

Table II. Summary of Regression Analyses of Children's Ability to Control Impulsiveness and Academic Motivation Predicting Academic Performance in Round Two (Spring 1999)

Variable	B	β	R^2 Change	p
Ability to Control Impulsiveness	.447	.063	.003	.00
Academic Motivation	2.24	1.99	.031	.00

Table III. Summary of Regression Analyses of Children's Ability to Control Impulsiveness and Academic Motivation Predicting Academic Performance in Round Three (Spring 2000)

Variable	B	β	R^2 Change	p
Ability to Control Impulsiveness	.388	.047	.002	.00
Academic Motivation	2.77	.196	.036	.00

Discussion

When children are about to enter primary school, they begin to outgrow an absolute self-definition (i.e., all-or-nothing) and develop more complex concepts of themselves (Harter, 1998). One of the self concepts they develop at this time is academic sense of self. This study focused on children's academic sense of self and explored the relationships among children's academic motivation, academic performance, and ability to self-control impulsive behaviors.

Children's Ability to Control Impulsiveness as a Predictor of Academic Motivation

In this study, findings showed that children's ability to control impulsiveness can predict academic motivation over a two-year period. The findings are similar to those of previous researchers. Bronson (2000) reported that children's belief in their own competence and their self-control abilities positively affect their academic efforts. Chong (2005) also showed that students' academic motivation can be promoted by enhancing their ability to control themselves.

The finding that children's ability to control impulsiveness can predict academic motivation over a two-year period indicated that children who can control impulsiveness show higher levels of academic motivation, whereas impulsive children show lower levels of academic motivation. In addition, the finding indicated that children's sense of self helps drive them to engage in academic activities. This implies that kindergarteners' and first graders' academic motivation can be intrinsic.

Children's Academic Motivation as a Predictor of Academic Performance

Academic motivation was found to predict academic performance over a two-year period, and this finding is consistent with those of previous studies (Reeves, 2002; Wigfield & Eccles, 2000). The finding indicates that children with high academic motivation demonstrate higher levels of academic performance than their low-motivated peers. Further, kindergarteners' and first graders' academic motivation can be self-driven. According to attribution theories (Graham, 1997; Weiner, 1986), children who drive themselves to study tend to attribute their academic performance to the efforts they have made. This attribution pattern may enhance a positive academic sense of self in children.

Children's Ability to Control Impulsiveness and Their Academic Motivation as Predictors of Academic Performance

Findings indicate that children's ability to control impulsiveness and their academic motivation both predict academic performance. When these two variables were combined, they contributed to 3.7%, 3.1%, and 3.8% of variance in academic performance in Round 1, Round 2, and Round 3, respectively. The two variables may lay a foundation for children to develop other factors that further influence their academic performance. For example, children's ability to control impulsiveness may enable them to build a good relationship with teachers, and this relationship positively influences children's academic performance (Furrer & Skinner, 2003).

When children are as young as kindergarteners and first graders, their abilities to control impulsiveness and their approaches to learning (academic motivation) work together to influence academic performance. During this period children start to develop metacognition, which enables them to self-observe and self-regulate their thoughts and behaviors (Ferrari & Sternberg, 1998). Therefore, it is likely that children's metacognition enhances their ability to control impulsiveness and increases their approaches to learning.

In this study, both of those variables directly and constantly influenced academic performance over the two-year period. Since children's ability to control impulsiveness directly influenced academic motivation, which in turn directly influenced academic performance across the two-year period, it is possible that academic motivation mediates between children's ability to control

impulsiveness and their academic performance. If that is true, then children's ability to control impulsiveness would least affect academic performance if they did not have academic motivation, and so if children lack motivation to learn, their ability to control impulsiveness may not boost their academic performance. On the other hand, when children do have enough motivation to learn, the more they can control impulsiveness, and the more their academic performance can be influenced by this ability of impulsiveness control.

In order to examine the hypothesis that academic motivation mediates between children's ability to control impulsiveness and their academic performance, this study applied Green, Salkind, and Akey's (2000) method of testing mediator variables. If children's academic motivation was the mediator, it should have dominated children's ability to control impulsiveness when these two variables were applied together to predict academic performance. Simultaneously, the effect of children's ability to control impulsiveness on academic performance should have shrunk to nearly zero. The hypothesis would have been supported if children's academic motivation had predicted academic performance and the ability to control impulsiveness hadn't. However, the test results reported in Tables I, II, and III indicate that the hypothesis was not supported. In Fall 1998, Spring 1999, and Spring 2000, both academic motivation and the ability to control impulsiveness could predict academic performance.

Conclusion, Implications, and Limitation

The major findings of the study are (a) children's ability to control impulsiveness directly and constantly influences their academic motivation and academic performance, (b) academic motivation directly and constantly influences academic performance, and (c) academic motivation does not function as a mediator between children's ability to control impulsiveness and their academic performance.

The findings seem to indicate that when children become able to control impulsiveness consistently, their self-control directly influences them to perform well in academic tasks. In addition, by stably controlling their impulsiveness, children enhance their intrinsic academic motivation. That in turn influences them to keep learning from interactions with their academic environment (e.g., teachers, parents, classmates, books), and therefore helps them achieve higher levels of academic performance. However, in such a person-environment interactional process, children's ability to control impulsiveness and their academic motivation do not influence each other to the extent that either variable can minimize the other's effect on children's academic performance.

The findings lead to the conclusion that, during kindergarten and first grade, children's ability to control impulsiveness plays an important role in directing their interactions with academic environments and it also contributes to their development of a positive academic sense of self.

The study results carry three implications. First, different aspects of individual children's self-concepts such as social competence and academic competence are closely associated with each other during kindergarten and first grade, but the association is not significantly influenced by the children's approaches to learning (academic motivation). Second, when children encounter challenging academic tasks, parents and educators should assist children to control their impulsive behaviors, as well as teaching them how to read, write, and solve problems. Third, when children become aware of their ability to control impulsive behaviors, they can motivate themselves to apply this ability to other life areas like academia, and thus explore their control over the world around them. Therefore, helping children to see their ability to control impulsive behaviors is a crucial task for parents and educators during children's kindergarten and first-grade years.

The major limitation of this study is the limited data set. Data on the study's three variables was only available when participants were in kindergarten and first grade. Therefore, there is not sufficient information for exploring the relationships among children's academic motivation,

academic performance, and ability to control impulsive behaviors after the first grade. Future studies may explore these interactions in older children.

References

- Alexander, K. L., Entwisle, D. R., & Dauber, S. L. (1993). First-grade classroom behavior: Its short- and long-term consequences for school performance. *Child Development, 64*, 801-814.
- Berk, L. E. (2005). *Infant, Child, and Adolescence* (5th ed.). Boston, MA: Allyn and Bacon.
- Bronson, B. M. (2000). *Self-regulation in early childhood: Nature and nurture*. New York: Guilford.
- Chong, W. H. (2005). The role of self-regulation and personal agency beliefs: A psychoeducational approach with Asian high school students in Singapore. *Journal for Specialists in Group Work, 30*, 343-361.
- Cook, J. L., & Cook, G. (2005). *Child Development: Principles and Perspectives*. Boston, MA: Allyn and Bacon.
- DiPerna, J. C., Volpe, R. J., & Elliott, S. N. (2005). A model of academic enablers and mathematics achievement in the elementary grades. *Journal of School Psychology, 43*, 379-392.
- Ferrari, M., & Sternberg, R. (1998). The development of mental abilities and styles. In W. Damon, D. Kuhn, & R. Siegler (Eds.), *Handbook of Child Psychology, Vol. 2* (5th ed.), Cognition, perception, and language (pp. 899-946). New York: John Wiley and Sons.
- Furrer, C., & Skinner, E. (2003). Sense of relatedness as a factor in children's academic engagement and performance. *Journal of Educational Psychology, 95*, 148-162.
- Graham, S. (1997). Using attribution theory to understand social and academic motivation in African American Youth. *Educational Psychologist, 32*, 21-47.
- Green, S. B., Salkind, N. J., & Akey, T. M. (2000). *Using SPSS for windows: Analyzing and understanding data* (2nd ed.). Upper Saddle River, NJ: Prentice Hall.
- Gresham, F. M., & Elliot, S. N. (1990). *Social Skills Rating Scale*. Circle Pines, MN: American Guidance Service.
- Harter, S (1998). The development of self-representations. In W. Damon (Series Ed.) and N. Eisenberg (Vol. Ed.), *Handbook of child psychology: Vol. 3. Social, emotional, and personality development* (5th ed., pp. 553-617). New York: Wiley.
- Midgley, C., Kaplan, A., & Middleton, M. (2001). Performance-approach goals: Good for what, for whom, under what circumstances, and at what cost? *Journal of Educational Psychology, 93*, 77-86.
- National Center for Education Statistics (2002). *User's manual for the ECLS-K first grade public-use data files and electronic code book NCES 2002-135*. Washington, DC: US Department of Education Institute of Education Sciences.
- Papalia, D. E., Olds, S. W., & Feldman, R. D. (2004). *Human Development* (9th ed.). New York: McGraw Hill.

Reeves, J. (2002). Self-determination theory applied to educational settings. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 183-203). Rochester, NY: University of Rochester Press.

Weiner, B. (1986). *An attributional theory of motivation and emotion*. New York: Springer-Verlag.

Wigfield, A., & Eccles, J. S. (2000). Expectancy-value theory of achievement motivation. *Contemporary Educational Psychology, 25*, 68-81.