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Early determinants of postsecondary education participation and degree attainment: Findings from an inner-city minority cohort

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Abstract

Early determinants of college attendance and degree attainment for economically disadvantaged minority youth were examined in the present study. The study sample (n=1,379) was drawn from the Chicago Longitudinal Study (CLS), an on-going investigation of a panel of low-income minority children born at 1980, growing up in high-poverty neighborhoods in Chicago. Regression findings indicated that three factors in elementary grades can potentially improve both college attendance and BA degree completion for economically disadvantaged minority students: better classroom adjustment, high parent expectation in child's education, and better academic performance. Findings have implications for schools, educators, and policy makers

Keywords

postsecondary education; college attendance; degree attainment; minority students

Higher education has been known to be beneficial to the individuals and the broader society. Some examples of the benefits include economic success and social mobility for individuals, and improving health and rising living standards for the society as a whole (Pascarella & Terenzini, 2005; Wolfe & Haveman, 2001). As President Obama has reiterated several times, higher education is critical to national economic and social prosperity. However, the rates of postsecondary education attendance are stagnant in the U.S. over the past years. Moreover, the income-related and racial gaps both in access to higher education and in college graduation rates are large and growing.

Low SES Americans are less likely to complete high school, enroll in college, and obtain a postsecondary credential than their middle- or higher SES peers (U.S. Department of Education, 2003). In the National Education Longitudinal Study of 1988 (NELS:88) cohort, by age 26 or 27, only 16.2% of students from the lowest 20 percentile SES families completed Bachelor's degree or higher, compared with 72.2% of those from the highest 20 percentile SES families (U.S. Department of Education, 2003). In 2007, 19 % of African-Americans and 12% of Hispanics between 25 and 29 years of age have earned a Bachelor's degree or higher, compared with 36 % of Whites (U.S. Census Bureau, 2008). Although the

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increasing federally financial aid programs facilitate access to college for low-income students, the gaps in college enrollment by family income are widening (Haveman & Smeeding, 2006). Economic need per se does not seem to fully explain college enrollment for low-income students (Carneiro & Heckman, 2002; Hossler, Schmitt & Vesper, 1999).

Furthermore, while the racial gaps in high school completion are closing, the racial gaps in college enrollment rates are widening (Kane, 2004). With the persisting concerns on equitable access to postsecondary education and the benefits related to postsecondary education, it is imperative to facilitate participation in postsecondary education for underrepresented groups. To achieve this, efforts start early in life is worth exploring further especially as educational attainment is a long-term process. Programs implemented in college aiming to improve retention rates or increase accessibility for underrepresented groups would be beneficial to certain students. However, those programs will not be able to reach students who are far remote from the college entrance gates. In other words, the most disadvantaged students who either dropped out of high school or would never considered attending college as an option in their life. The purpose of the present study is to examine early determinants of college attendance and degree attainment on a cohort of economically disadvantaged minority youth in inner-city Chicago. Understanding the early determinants of postsecondary education of this underrepresented group will inform both higher education research and policy.

Conceptual Framework: College Attendance as a Long-term Process

The ecological system theory emphasizes the framework of person-within-context within a comprehensive developmental approach that helps to explain how individual characteristics and environmental factors influence the process of educational attainment. A full elaboration of Bronfenbrenner's (1979, 1998) ecological system theory is beyond the scope of this paper, but it is important to emphasize that this perspective suggests that features of the individual, family, environment, and the interactions among them all influence a child’s development. College attendance is a socio-psychological phenomenon rather than an intellectual achievement within this framework. The factors contributing to college attendance come from different sources, such as school, parents, personal features, and school policy. Of these sources, although family is usually the most important system, particularly for children and adolescents, the overall impact of the environment emerges from the dynamic balance among all levels of influences.

Predictors of Postsecondary Education

There are numerous studies on postsecondary education, especially on enrollment, persistence, college decisions, and college experiences. Unlike secondary education, postsecondary education is a complicated process determined by not only the individuals but also the institutions. In particular, institutions play critical roles in the process, and can contribute significantly to promote college attendance and persistence. Therefore, many studies have been conducted on institutions and college retention. See Braxton (2000) and Seidman (2005) for more information. However, the focus of the present study is on alterable factors of college attendance directly related to individuals. Therefore, the review

here includes only relevant studies and they are discussed in the context of the ecological system theory.

Predictors of educational achievement and attainment are identified in numerous studies. First, sociodemographic factors (race, gender, and SES) and individual factors (cognitive ability and psychological factors) are identified as significantly related to educational attainment in many studies. These factors correspond to the person's characteristics in the ecological system theory. For instance, the gaps in college attendance by race and family income have been discussed frequently (Ellwood & Kane, 2000; Kane, 2004). White have higher rates of college attendance compared with Black and Hispanic. Gender (Hossler & Stage, 1992; Jacob, 2002; Kane, 2004; Trusty, Robinson, Plata & Ng, 2000) and socioeconomic status (Jacob, 2002), such as parent education (Christensen, Melder & Weisbrod, 1975; Eccles, Vida, & Barber, 2004; Ellwood & Kane, 2000; Hossler & Stage, 1992; Trusty et al., 2000), are also found to be associated with college attendance. Females have higher rates of college attendance compared with males. Students from higher SES families have higher rates of college attendance compared with those who from lower SES families. Individual factors, such as self-esteem and locus of control, are the "developmentally structuring characteristics" in the theory, which influence individual's interactions with the environment. Cognitive ability, such as the Intelligence Quotient (IQ), and academic performance, such as early achievement scores, receive the greatest attention (e.g., Alexander, Entwisle & Horsey, 1997).

Second, factors of family process (such as parent's attitude, value, and expectations) and school experiences (such as early achievement and absence) are identified as important predictors. The effects of these factors can be explained through proximal processes in the ecological system theory. Family context (e.g., family structure, and the level of parents' education) and functioning (e.g., whether the parents are involved in the child's education; and the parents' expectations for the child's educational attainment) are associated with educational attainment (Ekstrom, Goertz, Pollack & Rock, 1986; Miedel and Reynolds 1999). Family resources, such as parental expectations, parent/adolescent discussion of school activities, parental involvement in school activities, and parent-school academic contact (Eccles et al., 2004; Hossler & Stage, 1992; Martinez & Klopott, 2005; Sandefur, Meier, Campbell, 2006), are related to college enrollment.

In addition, specific school experiences, such as school mobility, have been found to have effects on education (Mehana and Reynolds 2004). However, findings concerning the effects on education of other school-related indicators, such as school quality, are mixed (Card and Krueger 1996; Greenwald, Hedges, and Laine 1996). In terms of non-scholastic predictors, socio-emotional and behavioral indicators, such as hyperactivity, inattentiveness, self-esteem, future expectations, peer relations, and antisocial behavior, are found to be associated with educational outcomes (Ekstrom et al. 1986; Rumberger 1987; Fagan and Pabon 1990; Rosenthal 1998). See Ou & Reynolds (2008) for a review of research on educational attainment.

Academic preparation and performance are associated with college attendance (Eccles et al., 2004; Ellwood & Kane, 2000; Hossler & Stage, 1992; Jacob, 2002; Martinez & Klopott,

2005; Trusty et al., 2000; St. John 1991). Students' plans for college and education aspirations are also associated with college attendance (Eccles et al., 2004; St. John, 1991). Some school factors, such as Catholic school attendance and school mobility, are related to postsecondary enrollment (Sandefur et al., 2006).

Finally, a number of factors on the structure of schools (such as types of high schools and school climate), and family (such as family structure and size) identified as important predictors correspond to the context (micro-, meso-, and macrosystem) in the ecological system theory. For example, factors related to the microsystem, like resources at home (SES, family size, parent's educational attainment, and single parent family), and in school (school size and teacher/student ratio), are significantly related to educational attainment. Factors related to the mesosystem include a parent's involvement in school, the linkage between two microsystems: home and school.

Some limitations in the literature are evident. First, the process of college attendance should be considered a social-psychological rather than just an intellectual achievement. Postsecondary education enrollment and degree completion results from a long-term process of interactions among an array of factors (Cabrera, Burkum & La Nasa, 2005; Tinto, 1993). It is critical to acknowledge that the overall impact emerges from the dynamic balance among all levels of influences in the environment. However, majority of the studies in college attendance have focused on academic achievement or family factors, and neglected the potential influence of individual's social psychological abilities in the process. Second, although researchers are aware that college attendance is a long-term process, most studies have focused on factors occurred later. In addition to the factors related to institutions, research on predictors of college attendance addresses socioeconomic status, family, and high school experiences. Other than sociodemographic factors, most factors examined occurred in high school due to the availability of the data. Few studies have assessed early factors that might predict college enrollment or degree completion (Eccles et al., 2004). Longitudinal studies spinning from early childhood to adulthood would provide insights on the early determinants of college attendance.

Finally, it is crucial to promote college persistence, but it is also crucial to promote college attendance. Many young adults, especially economically disadvantaged minority youth, do not attend college or do not attempt to attend college. To promote college attendance of the underrepresented groups, it is necessary to broaden the population pool that can be reached through existing programs and policies currently. Studying a cohort of disadvantaged group starting from childhood can help us understand this underrepresented group more. Because it might be more effective to try to alter the trajectories early on rather than late in the life course, identifying early factors would provide information to promote college attendance and degree completion for this disadvantaged group cost-effectively.

The Present Study

Using data from the on-going, 20-year Chicago Longitudinal Study (CLS), the present study is unique in important respects. First, the sample of the CLS is minority youth living in high poverty neighborhoods, an underrepresented group in postsecondary education enrollment. This longitudinal dataset provides a unique opportunity to examine postsecondary education

enrollment in this low-income minority community and to explore how postsecondary education might be affected by early life experiences. The findings will identify early factors that can be used to promote college attendance for this specific group. For example, identifying alterable predictors will contribute to the design of effective preventive programs, in particular to improve college enrollment for low-income minority youth. Second, longitudinal data are used spanning birth to young adulthood, which enables an examination of early characteristics that other studies cannot examine, especially factors prior to high school. Factors examined in college or high school can provide information on intervention strategies, but have limited implications on early intervention. In many cases, intervention in high school might not be as effective as intervention provided early in life. For example, high school dropout prevention programs might not be as cost-effective as early childhood education programs on preventing high school dropout (Heckman, 2000). Many factors (such as parent involvement and social adjustment) can be altered through intervention programs. Results of the present study will inform research on issues related to postsecondary education for underrepresented groups.

Methods

Sample and data

The study sample was drawn from the Chicago Longitudinal Study (CLS, 2005), an ongoing investigation of a panel of low-income minority (93% African American; 7% Hispanic) children growing up in high-poverty neighborhoods in Chicago. The original sample (N=1,539) of the CLS included 989 children who entered the Chicago Child-Parent Center (CPC) program in preschool and graduated from kindergarten in 1986 from 20 Centers, and 550 children who participated in alternative government-funded kindergarten programs in the Chicago Public Schools in 1986 without CPC preschool experience. Continuously promoted children graduated from high school in 1998.

A significant proportion (over 60%) of the study sample participated in the CPC program. The CPC Program is a center-based early childhood intervention that serves high-poverty neighborhoods that are not being served by Head Start or other early intervention programs. Eligible children may attend the program for up to six years from ages 3 to 9. The main goal of the CPCs is to promote children's school competence, especially school readiness and academic achievement, by providing comprehensive educational and family-support services. See Reynolds (2000) for more information on the CPC program. The CPC preschool program has been found to be associated with positive long-term outcomes, such as lower rates of grade retention, juvenile arrest, and incarceration, and a higher rate of high school completion (Ou, 2005; Ou & Reynolds, 2006; Reynolds, Temple, Robertson, & Mann, 2001; Reynolds, Temple, Ou, Robertson, Mersky, Topitzes et al., 2007). Therefore, the program participation was included as one of the covariates.

The study sample included 1,379 youth whose status of educational attainment could be determined by August 2006 (mean age = 26). Students in and outside of the Chicago Public Schools were located. Data have been collected longitudinally starting from child’s birth from various sources, such as participants, parents, teachers, and schools (CLS, 2005;

Reynolds, 2000). Data of postsecondary education were collected from the colleges youth attended, supplemented with self-report for those who school records were not available.

Measures

Table 1 defines the variables in the present study. Explanatory variables were described in the following categories: CPC program participation, sociodemographic factors, school adjustment and family functioning, commitment to child's education, school-based functioning, and life events. Dichotomous variables were used for sociodemographic factors because most of the characteristics were categorical, such as gender, race/ethnicity, free lunch eligibility, single parent status, and teen parent status. Dichotomous variables were employed for other factors (maternal education, maternal employment status, and family size), because it is more meaningful to examine the difference between above and below a certain threshold in those characteristics (such as if mother completed high school or not) than to examine the difference between a continuous scale. Such thresholds are meaningful because they might have different effects on education attainment (Rumberger & Larson, 1998; Steinberg, Blinde & Chan, 1984; Frank, 1990; Kronick & Hargis, 1990; Roderick, 1993). Table 2 provides the valid sample sizes and means for key variables.

Data Analysis

Regressions analyses were employed to analyze the data. All the outcome measures were dichotomous variables, so logistic regressions were used. Explanatory variables were entered hierarchically, following the sequence: CPC program participation and sociodemographic factors, school adjustment and family functioning, commitment to child's education, and school-based factors. The sequence was determined based on the timing of the measures. The final model included all explanatory variables. SPSS 17.0 was used to conduct the analyses.

The coefficients for explanatory variables in logistic regression analysis were presented in odds ratios. An odds ratio is the odds of being in a group (outcome) for a particular value of the predictor, divided by the odds for the predictor value that is one unit lower. In other words, an odds ratio indicates the amount the odds of being in a group are multiplied when the predictor (independent variable) is incremented by a value of one unit (Cohen, Cohen, West & Aiken, 2003). Odds ratios greater than 1 indicate positive regression coefficients, and reflect the increase in odds of being in the group (outcome) associated with each unit increase in the predictor (independent variable). Odds ratios less than 1 indicate negative regression coefficients, and reflect the decrease in odds of being in the group (outcome) associated with each unit increase in the predictor (independent variable). For example, if the odds ratio on college attendance for whether students expecting to go to college or not (dichotomous variable) is 2.2, it indicates if students expected to go to college then they were 2.2 times more likely to attend college than those who did not expect to go to college.

Results

In 2006, 58% of all 25–29 years olds had at least some college experience: 66% of Non-Hispanic White vs. 50% of Black (U.S. Census Bureau, 2007). Educational attainment at

age 26 in the study sample was lower than the national average. About 40 percent of the study sample attended either a 2-year or 4-year college by age 26. About 20 percent attended 4-year college among the participants who ever attended college by age 26.

Early Determinants of Postsecondary Education Participation

The analyses followed a loose chronological structure; for example, early blocks in the model captured variables that were, on average, measured early in the life course. Due to this hierarchical ordering, variables identified as statistically significant predictors in early steps were less likely to retain their associations as additional variables were added to the model. It is likely that later variables act as mediators between early antecedents and outcomes.

Following the sequences described earlier, variables were entered hierarchically. Results were briefly described by steps. The first step (covariates) included CPC program variables and sociodemographic variables. Black, mother not completed high school, and TANF/AFDC participation were associated with lower rates of college attendance and 4-year college attendance ($p < .05$). Female was associated with higher rates of college attendance and 4-year college attendance ($p < .01$). Eligibility of free lunch and 4 or more children in household were associated with a lower rate of college attendance ($p < .05$). None of the covariates was significantly associated with BA degree completion.

In the second step, school adjustment and family functioning variables were added. Classroom adjustment was significantly associated with higher rates of college attendance, 4-year college attendance, and BA degree completion ($p < .01$). Troublemaking behavior was negatively associated with BA degree completion ($p < .05$), but was not associated with other outcomes. Parent involvement in school was associated with higher rates of college attendance and 4-year college attendance ($p < .01$), but was not associated with the BA degree completion.

Factors on commitment to education were added in step three. Parent expectations for the child's education were associated with higher rates of 4-year college attendance and BA degree completion ($p < .05$). Both students' expectation for attending college and truancy were associated with college attendance and 4-year college attendance ($p < .05$) in the expected directions. School-based functioning factors were entered in step fourth. ITBS reading scores appeared to be the most robust predictor in this group; it was significantly associated with all three outcomes. School mobility (grades 4–8) was only associated with a lower rate of 4-year college attendance ($p < .05$). See Appendices 1–3 for tables of step-by-step findings on the 3 outcomes.

Table 3 presents results from the model included all factors except life events. Most of the factors significant in previous models remained significant in this model. Among sociodemographic factors, female, mother not completed high school, 4 or more children in household remained associated with college attendance ($p < .05$). Black, mother not completed high school, TANF or AFDC participation, remained associated with 4-year college attendance ($p < .05$). None of the sociodemographic factors were significantly associated with BA degree completion. Classroom adjustment and ITBS reading scores were

positively associated with all 3 outcomes ($p < .05$). Parent involvement in school, student expectation to attend college, and truancy were associated with both college attendance and 4-year college attendance in the expected directions ($p < .05$). Trouble making behavior was associated with a lower rate of BA degree completion ($p < .05$). School mobility was associated with a lower rate of 4-year college attendance ($p < .05$). Parent expectation for child's education was associated with higher rates of 4-year college attendance and BA degree completion ($p < .05$).

Discussion

Findings from regressions indicate that college attendance and BA degree completion can be predicted by factors occurred as early as elementary grades. Significant factors are similar between college attendance and 4-year college attendance, but only a few factors are significantly associated with BA degree completion. To summarize, academic performance, social adjustment, parent involvement in school, parent expectation, student expectation, and truancy are important factors for college attendance and degree completion. Consistent with the ecological system theory, factors from various systems are associated with college attendance. Among the statistically significant factors, classroom adjustment (ages 7–12) and academic performance (at age 14) are associated with all 3 outcomes. The connection between academic performance and college attendance is well established (Eccles et al., 2004; Ellwood & Kane, 2000), but the connection between classroom adjustment in elementary grades and college attendance has been overlooked until recently.

Classroom adjustment can be classified as one of the non-cognitive abilities. Traditionally, cognitive abilities gain much attention than non-cognitive abilities in educational studies. Both cognitive and non-cognitive abilities are part of individual characteristics, but the latter emphasizes on the competence of interactions between individuals and other people in the environment. Recent studies have found that non-cognitive abilities might have a greater effect on schooling and other outcomes than does cognitive abilities (Heckman & Rubinstein, 2001; Heckman, Stixrud & Urzua, 2006), and students who had higher emotional and social competencies are more likely to persist in college (Parker, Hogan, Eastabrook, Oke, & Wood, 2006). Findings from the present study collaborate with recent studies on the significance of non-cognitive abilities. In the present study, only 4 factors are significantly associated with BA degree completion, and 2 of them (classroom adjustment and troublemaking behavior) are related to non-cognitive abilities. Thus, the roles of non-cognitive abilities play in the process of higher education shed light on the research of college persistence. Further research would help identify powerful intervening points to promote degree completion for such disadvantaged group.

Parent involvement, students' expectation to attend college, and truancy, are significantly associated with both outcomes of college attendance, but not with BA degree completion. The relation between family resources and educational attainment is supported in previous studies (Ekstrom et al 1986; Sandefur et al 2006), and researchers have contributed such a relation to parental education level and family income according to social and cultural capital (Perna & Titus, 2005). See Bourdieu (1986) and Coleman (1988) for more information on social capital. Nevertheless, not all family resources have the same influence

on higher education. For instance, parent expectations for child's education is significantly associated with both 4-year college attendance and BA degree completion, but not with college attendance. This suggests that parent expectations might have specific influence on 4-year institution attendance and further on BA degree completion. Thus, policymakers might want to target increasing parent expectations through promoting parents education or other strategies if the goal is to promote attendance on 4-year institutions and BA degrees in the long run.

Findings show that grade retention is not associated with any of the outcomes, which is inconsistent with previous research (Alexander, Entwisle, & Dauber, 2003; Ou & Reynolds, 2010; Temple, Reynolds & Ou, 2004). The experience of grade retention could depress self-esteem and trigger a set of school experiences and adult expectations that lead to an increased risk of school dropout, and then lead to lower rates of postsecondary education (Ou & Reynolds, 2010). It is likely that grade retention is interacting with other factors; therefore, it is not significant in the regression model. In addition, grade retention is correlated with school dropouts, so there might be limited youth who were retained included in the samples of 4-year college attendance and BA degree completion.

Consistent with previous findings (Alexander, Entwisle & Kabbani, 2001; Entwisle, Alexander & Olson, 2005; Wilson, 1987), sociodemographic factors of race/ethnicity, family income status, and parent education are significantly associated with college attendance in the expected directions, although not so for BA degree completion. These findings provide support to the powerful direct effects of demographic factors on higher education, especially parental education. A major strength of the present study is that the major predictors exert their influence above and beyond that of sociodemographic factors.

Conclusion

There are several limitations of the present study. First, the study investigated associations among variables rather than causal mechanisms. Although the prospective, longitudinal design increased confidence in the direction of the relations between the predictors and outcomes, caution should be exercised when making causal interpretations. Second, the CLS follows a selective sample of predominantly African American children who grew up in high-poverty neighborhoods in Chicago. Therefore, findings may not be generalized to dissimilar samples. Third, some variables (e.g. characteristics of institutions and financial aid) identified as predictors of college enrollment and college persistence in previous studies were not included in the present study because of the availability of data. The potential of omitted variables should not be ignored.

Implications

Despite these limitations, findings have implications for schools, educators, and policy makers. First, early influences from childhood are found to have lasting effects into emerging adulthood. The predictive power of the childhood precursors of college attendance provides justification for early intervention. As Heckman (2006, p. 1900) pointed out that life cycle skill formation is dynamic process in which early inputs strongly affect the productivity of later inputs, the process of educational attainment is a constant interaction

between individuals and the environment, and altering factors in the process will have impact on the trajectory. For example, family process factors can promote children's college attendance as parent involvement in school in elementary grades is positively linked to college attendance. Comprehensive early childhood intervention (Karoly, Kilburn, Bigelow, Caulkins & Cannon, 2001; Schweinhart et al., 2005) and school reform models, such as Comer's School Development Program promote school-family partnerships, strengthen parenting practices, and increase parent involvement in school, might lead to higher rates of college attendance (Patrikakou, Weissberg, Redding, & Walberg, 2005). This example demonstrates how the findings from the present study can be applied to the design of intervention programs to increase individuals' possibility of college attendance. The early determinants can also be used to identify groups that are most in need of prevention programs. Second, for educators and other professionals, the findings provide them intervening factors to address in order to promote college attendance. For example, classroom adjustment is associated with all outcomes positively. Programs that identify children who demonstrate adjustment difficulties and provide services to help those children improve social adjustment might increase those children's chance of attending college in the future.

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Appendix 1

Odds Ratio (N=1,379) Results by Models of Any College Attendance

Explanatory variables	Model 1	Model 2	Model 3	Model 4	Model 5
CPC program participation					
CPC preschool participation	.916	.790	.796	.776	.750
CPC school-age participation	1.330*	1.152	1.139	1.103	1.229
Sociodemographic factors:					
Black	.528**	.627	.608*	.617	.673
Female	2.213**	1.702**	1.632**	1.584**	1.407*
Eligible for free school lunch age 8	.718*	.783	.830	.878	.816
Mother did not complete high school age 8	.471**	.566**	.604**	.621**	.665**
Single parent status age 8	.825	.872	.911	.914	.938
Four or more children in household age 8	.693**	.728*	.746*	.754*	.815
Mother less than 18 years at child's birth	1.036	1.028	1.025	1.050	1.047
TANF or AFDC participation age 8	.673*	.728	.735	.746	.809
Mother unemployed age 8	1.044	1.073	1.104	1.117	1.188

Explanatory variables	Model 1	Model 2	Model 3	Model 4	Model 5
Any child welfare history by age 4	.690	.682	.685	.695	.678
If missing five or more variables	.987	1.052	1.502	1.536	1.206
School adjustment and family functioning:					
Word analysis (age 6)		1.000	1.000	.994	.998
Classroom adjustment (ages 7–12)		1.085**	1.074**	1.047*	1.033
Perceived cognitive competence (ages 9–12)		1.223*	1.200	1.157	1.163
Troublemaking behavior (ages 9–12)		1.026	1.036	1.047	1.126
Parent involvement (ages 7–12)		1.427**	1.370**	1.325**	1.225*
Commitment to education:					
Parent expectations for child's education (years)			1.070	1.045	1.017
Student expected to go to college			1.434*	1.349*	1.148
Days of absence from school by age 12			.958**	.960**	.981
School- based functioning:					
Grade retention (ever; ages 7–14)				.713	.786
Number of school move (ages 10–14):				.936	1.048
Ever enrolled in magnet schools (ages 10–14)				1.223	1.025
ITBS reading scores (age 14)				1.012**	1.011*
Life event:					
Graduation by age 19					5.726**
−2 log likelihood	1709.23	1609.59	1590.27	1571.48	1414.19
Cox and Snell R Square ^{2}	.099	.162	.174	.185	.273
Observed rate	39.7	39.7	39.7	39.7	39.7
Percent correct for those coded 1	40.5	49.3	50.9	54.7	68.4
Overall percent correct	66.1	69.2	69.6	71.4	74.5

Note. The rest is odds ratio.

* p < .05

** p < .01.

Appendix 2

Odds Ratio (N=1,034) Results by Models of Any 4-year college Attendance

Explanatory variables	Model 1	Model 2	Model 3	Model 4	Model 5
CPC program participation					
CPC preschool participation	1.206	.918	.970	.920	.866
CPC school-age participation	1.198	.806	.790	.744	.864
Sociodemographic factors:					
Black	.346**	.474*	.444*	.461*	.530
Female	2.38**	1.34	1.231	1.254	1.000
Eligible for free school lunch age 8	.839	1.054	1.214	1.381	1.530
Mother did not complete high school age 8	.350**	.446**	.523**	.540**	.569*
Single parent status age 8	.826	.911	.987	1.010	.931

Explanatory variables	Model 1	Model 2	Model 3	Model 4	Model 5
Four or more children in household age 8	.750	.815	.899	.886	.952
Mother less than 18 years at child's birth	1.286	1.508	1.458	1.494	1.540
TANF or AFDC participation age 8	.428**	.462**	.440**	.436**	.430**
Mother unemployed age 8	1.157	1.154	1.254	1.269	1.593
Any child welfare history by age 4	.128*	.113*	.127	.117	.071*
If missing five or more variables	1.189	1.467	3.008**	4.310**	3.445**
School adjustment and family functioning:					
Word analysis (age 6)		1.002	1.002	.992	.995
Classroom adjustment (ages 7–12)		1.190**	1.162**	1.108**	1.099*
Perceived cognitive competence (ages 9–12)		1.368	1.398	1.257	1.308
Troublemaking behavior (ages 9–12)		.920	.942	.977	1.095
Parent involvement (ages 7–12)		1.657**	1.553**	1.438**	1.367
Commitment to education:					
Parent expectations for child's education (years)			1.234**	1.194**	1.178*
Student expected to go to college			1.942*	1.824*	1.535
Days of absence from school by age 12			.926**	.927**	.960
School- based functioning:					
Grade retention (ever; ages 7–14)				.723	1.252
Number of school move (ages 10–14):				.741*	.903
Ever enrolled in magnet schools (ages 10–14)				1.067	.767
ITBS reading scores (age 14)				1.031**	1.035**
Life event:					
Graduation by age 19					38.00**
−2 log likelihood	895.59	749.65	718.70	684.21	538.49
Cox and Snell R Square [2]	.115	.231	.254	.278	.373
Observed rate	19.5	19.5	19.5	19.5	19.5
Percent correct for those coded 1	11.9	38.1	40.6	43.6	61.9
Overall percent correct	81.4	84.2	85.0	85.0	87.2

Note. The rest is odds ratio.
*
p < .05
**
p < .01.

Appendix 3

Odds Ratio (N=548) Results by Models of BA Degree Attainment

Explanatory variables	Model 1	Model 2	Model 3	Model 4	Model 5
CPC program participation					
CPC preschool participation	.808	.771	.795	.835	.820
CPC school-age participation	1.645	1.360	1.310	1.337	1.411
Sociodemographic factors:					
Black	.484	.559	.548	.625	.643

Explanatory variables	Model 1	Model 2	Model 3	Model 4	Model 5
Female	1.234	.833	.777	.809	.827
Eligible for free school lunch age 8	.608	.634	.721	.756	.698
Mother did not complete high school age 8	.735	.931	1.01	1.071	1.083
Single parent status age 8	.629	.679	.747	.694	.734
Four or more children in household age 8	.937	.783	.782	.754	.795
Mother less than 18 years at child's birth	1.465	1.245	1.17	1.098	1.133
TANF or AFDC participation age 8	.608	.865	.850	.835	.939
Mother unemployed age 8	1.326	1.249	1.396	1.356	1.293
Any child welfare history by age 4	.000	.000	.000	.000	.000
If missing five or more variables	.857	1.081	2.275	3.134	2.968
School adjustment and family functioning:					
Word analysis (age 6)		.998	.997	.993	.995
Classroom adjustment (ages 7–12)		1.157**	1.148**	1.106*	1.087
Perceived cognitive competence (ages 9–12)		1.279	1.235	1.150	1.186
Troublemaking behavior (ages 9–12)		.595*	.623*	.626*	.646
Parent involvement (ages 7–12)		1.040	.980	.984	.969
Commitment to education:					
Parent expectations for child's education (years)			1.279*	1.253*	1.227
Student expected to go to college			2.086	1.867	1.724
Days of absence from school by age 12			.976	.977	.982
School- based functioning:					
Grade retention (ever; ages 7–14)				.981	1.147
Number of school move (ages 10–14):				.892	.930
Ever enrolled in magnet schools (ages 10–14)				.679	.722
ITBS reading scores (age 14)				1.023**	1.023*
Life event:					
Graduation by age 19					11.12**
−2 log likelihood	411.38	373.17	363.80	358.03	346.45
Cox and Snell R Square ^{2}	.040	.105	.120	.129	.147
Observed rate	13.5	13.5	13.5	13.5	13.5
Percent correct for those coded 1	0	1.4	4.1	9.5	12.2
Overall percent correct	86.5	85.8	85.4	86.1	86.3

Note. The rest is odds ratio.

* $p < .05$

** $p < .01$.

Table 1

Definition of variables

Variables	Definition
Postsecondary education by age 26	
College attendance	Ever attended any 2- or 4-year college (1 = yes, 0 = no) by August 2006. N=1,379.
4-year college attendance	Ever attended any 4-year college (1 = yes, 0 = no) by August 2006. Participants who attended 2-year college but not 4-year college were excluded from this variable. N=1,034.
BA degree completion	Completed BA degree (1 = yes, 0 = no) by August 2006. The sample included only participants who were ever attended any college. N= 548.
CPC program participation	
CPC preschool participation	Participated in CPC preschool program (1 = yes, 0 = no).
CPC school-age participation	Participated in CPC school-age program (1 = yes, 0 = no).
Sociodemographic factors:	
Black	Race/ethnicity (1 = Black, 0 = Hispanic)
Female	Sex (1 = female, 0 = male)
Eligible for free school lunch	Eligibility for free school lunch by child's age 8 (1 = yes, 0 = no).
Mother did not complete high school	Mother did not compete high school by age 8 (1=did not complete high school, 0 = completed high school).
Single parent status	Single parent status by child's age 8 (1 = single parent, 0 = not single parent).
Four or more children in household	Four or more children in household by child's age 8 (1 = yes, 0 = no).
Mother less than 18 years at child's birth	Mother less than 18 years at child's birth (1 = yes, 0 = no).
TANF or AFDC participation	Family public aid receipt (TANF or AFDC) by child's age 8 (1 = yes, 0 = no).
Mother unemployed	Mother unemployed by child's age 8 (1 = unemployed, 0 = employed).
Any child welfare history	Any substantiated abuse or neglect report on the child's family by child's fourth birthday. (1 = yes, 0 = no).
Missing index	If missing five or more variables (1 = yes, 0 = no).
School adjustment and family functioning:	
Word analysis (age 6)	Score of word analysis of the Iowa Test of Basic Skills at age 6. Scale consists of 35 items that evaluate such participant prereading skills as letter-sound recognition and rhyming.
Classroom adjustment (ages 7–12)	Classroom adjustment was measured on a six-item scale rated by teachers from grades 1 through 6 (ages 7–12). Teachers were asked to rate children on items, such as concentrates on work, whether the child follows direction, and whether the child takes responsibility for actions (alpha = .91). Teachers' responses ranged from poor or not at all (1) to excellent or very much (5). The average score was used.
Perceived cognitive competence (ages 9–12)	Perceived cognitive competence was measured through participants' rating on their competence in school from grades 3 to 6 (ages 9–12) on nine items (e.g., "I answer questions in class", "I get good grades in school", "I try hard in school"). In grades 3 and 4, each item was measured on a three-point scale (1 = not much; 2 = some; 3 = a lot). In grades 5 and 6, a four-point scale was used; responses ranged from strongly agree (1) to strongly disagree (4). The sum of the nine items was calculated to obtain a total score for each year. The totals of each year were then transformed into Z-scores and averaged from grades 3 through 6.
Troublemaking behavior (ages 9–12)	Troublemaking behavior was measured from grades 3 to 6 (ages 9–12). It was measured by student ratings on four items ("I get in trouble at school"; "I get in trouble at home"; "I follow class rules"; and "I fight at school") related to participants' behavior at school and home. In grades 3 and 4, each

Variables	Definition
	item was based on a three-point scale (1 = not much; 2 = some; 3 = a lot). A four-point scale was used in grades 5 and 6; responses range from strongly agree (1) to strongly disagree (4). A total score for each year was calculated by summing up all items. The total scores of each year were then transformed into Z-scores and averaged across grades 3 through 6.
Parent involvement (ages 7–12)	Parent involvement was measured through parents' involvement at their child's school. It was assessed yearly by teachers between grades 1 and 6 (ages 7–12). Teachers rated "parent's participation in school activities" on a 5-point scale, from poor or no involvement (1) to excellent or much involvement (5). The average score between ages 7 and 12 was used.
Commitment to education:	
Parent expectations for child's education (years)	Parental expectation concerning the child's educational attainment was measured by an item in the fourth grade (age 10), which asked parents about their expectations concerning the highest education level their child will reach. The results were coded into a four-point scale: some high school (1); completed high school (2); some college (3); and completed 4-year college (4). The 4-point scale was transformed into years of education: 10 years (1); 12 years (2); 14 years (3); and 16 years (4). Missing values at fourth grade were imputed with information from second grade. If responses were missing from both the second- and fourth-grade, information from the eleventh grade was used.
Student expected to go to college	Students' expectation was measured through a dichotomous variable indicating whether students expected to go to college. This measure was based on the item, "How far in school do you think you will get?" from a survey in participants' fourth grade year. If students' scores were missing from the fourth grade survey, tenth-grade survey responses on the same item was used.
Truancy by age 12	Number of absent days by age 12 rated by teachers at fifth and sixth grades and by parents at fourth grade. Averages of fifth-grade and sixth-grade teacher ratings were used. If one was missing from both teacher ratings, parents' ratings were used. A composite measure was constructed and it ranged from 1 to 5. The 5-point scale was re-coded into days of absence based on the following rules: 2 days (1); 6 days (1.5–2); 10 days (2.5 to 3); and 17 days (above 3).
School- based functioning:	
Grade retention	Ever retained in grades 1 through 8 (ages 7 to 14, 1 = yes, 0 = no).
Number of school move	Number of school moves between grades 4 and 8 (ages 10–14).
Ever enrolled in magnet schools	Ever enrolled in magnet schools (1 = yes, 0 = no) between ages 10 and 14.
ITBS reading scores	Iowa Test of Basic Skills (ITBS) reading scores at age 14. The reading test contained 58 items and emphasized understanding of text passages. The reliability was .92.

Table 2

Descriptive Statistics for Study Variables (N = 1,379)

Measures	N	Min.	Max.	Mean	SD
CPC program participation					
CPC preschool participation	1379	0	1	.65	.48
CPC school-age participation	1379	0	1	.56	.50
Sociodemographic factors:					
Black	1379	0	1	.93	.25
Female	1379	0	1	.52	.50
Eligible for free school lunch age 8	1326	0	1	.83	.38
Mother did not complete high school age 8	1364	0	1	.44	.50
Single parent status age 8	1356	0	1	.60	.49
Four or more children in household age 8	1373	0	1	.33	.47
Mother less than 18 years at child's birth	1348	0	1	.17	.38
TANF or AFDC participation age 8	1324	0	1	.58	.49
Mother unemployed age 8	1294	0	1	.52	.50
Any child welfare history by age 3	1307	0	1	.04	.19
If missing five or more variables	1379	0	1	.11	.31
School adjustment and family functioning:					
Word analysis (age 6)	1373	19.0	99.0	63.98	13.25
Classroom adjustment (ages 7–12)	1326	7.50	30.0	19.07	4.41
Perceived cognitive competence (ages 9–12)	1234	−3.03	1.86	−.01	.80
Troublemaking behavior (ages 9–12)	1233	−1.73	2.65	.01	.78
Parent involvement (ages 7–12)	1320	1.0	5.0	2.55	.88
Commitment to education:					
Parent expectations for child's education (years)	1066	10.0	16.0	14.4	1.89
Student expected to go to college	1105	0	1	.81	.40
Truancy by age 12	1118	2	17	7.21	5.03
School- based functioning:					
Grade retention (ever; ages 7–14)	1379	0	1	.25	.44
Number of school move (ages 10–14):	1266	0	4	.94	.98

Measures	N	Min.	Max.	Mean	SD
Ever enrolled in magnet schools (ages 10–14)	1379	0	1	.10	.30
ITBS reading scores (age 14)	1252	77.0	212.0	145.31	21.72
Life Event:					
Graduation by age 19	1379	0	1	.52	.50
Postsecondary education by age 26					
Any college attendance	1379	0	1	.40	.49
4-year college attendance	1034	0	1	.20	.40
BA degree completion	548	0	1	.14	.34

Table 3

Odds ratio of the models

Explanatory variables	Any college attendance (N=1,379)	4-year college attendance (N=1,034)	BA degree (N=548)
CPC program participation			
CPC preschool participation	.776	.920	.835
CPC school-age participation	1.103	.744	1.337
Sociodemographic factors:			
Black	.617	.461*	.625
Female	1.584**	1.254	.809
Eligible for free school lunch age 8	.878	1.381	.756
Mother did not complete high school age 8	.621**	.540**	1.071
Single parent status age 8	.914	1.010	.694
Four or more children in household age 8	.754*	.886	.754
Mother less than 18 years at child's birth	1.050	1.494	1.098
TANF or AFDC participation age 8	.746	.436**	.835
Mother unemployed age 8	1.117	1.269	1.356
Any child welfare history by age 3	.695	.117	.000
If missing five or more variables	1.536	4.310**	3.134
School adjustment and family functioning:			
Word analysis (age 6)	.994	.992	.993
Classroom adjustment (ages 7–12)	1.047*	1.108**	1.106*
Perceived cognitive competence (ages 9–12)	1.157	1.257	1.150
Troublemaking behavior (ages 9–12)	1.047	.977	.626*
Parent involvement (ages 7–12)	1.325**	1.438**	.984
Commitment to education:			
Parent expectations for child's education (years)	1.045	1.194**	1.253*
Student expected to go to college	1.349*	1.824*	1.867
Truancy by age 12	.960**	.927**	.977
School- based functioning:			
Grade retention (ever; ages 7–14)	.713	.723	.981
Number of school move (ages 10–14):	.936	.741*	.892
Ever enrolled in magnet schools (ages 10–14)	1.223	1.067	.679
ITBS reading scores (age 14)	1.012**	1.031**	1.023**
−2 log likelihood	1571.48	684.21	358.03
Cox and Snell R Square ^{2}	.185	.278	.129
Observed rate	39.7	19.5	13.5
Percent correct for those coded 1	54.7	43.6	9.5
Overall percent correct	71.4	85.0	86.1

Note.

* $p < .05$

** $p < .01$