HHS Public Access

Author manuscript

*J Sch Psychol*. Author manuscript; available in PMC 2019 April 01.

Published in final edited form as:

*J Sch Psychol*. 2018 April ; 67: 163–178. doi:10.1016/j.jsp.2017.11.001.

# Chronic Absence, Eighth-Grade Achievement, and High School Attainment in the Chicago Longitudinal Study

**Nicole E. Smerillo**, **Arthur J. Reynolds**, **Judy A. Temple**, and **Suh-Ruu Ou**

University of Minnesota

## Abstract

Although not as commonly reported as average daily attendance, chronic absence data may be of significant importance for understanding student success. Using data from 1,148 participants in the Chicago Longitudinal Study, we assessed the associations of chronic absence in the early middle grades, grades fourth through sixth, with eighth-grade achievement and three measures of high school attainment including four-year graduation by diploma, graduation by diploma by age 21, and any high school completion by age 21. The rate of chronic absenteeism, defined here as students missing approximately 14 days of school or more in a year, was 15%. Using Ordinary Least Squares, probit regression, and inverse-probability-weighting regression-adjustment methods (IPWRA), results indicated that chronic absence in the middle grades was negatively associated ($d = -.17$) with math achievement and reduced the probability of four-year graduation by diploma by 18 percentage points, graduation by diploma by age 21 by 17 percentage points, and any high school completion by age 21 by 11 percentage points. IPWRA yielded similar estimates. Coefficients varied by subgroup with males and children of mothers who completed high school experiencing more detrimental effects. Associations of chronic absence with outcomes are important to understand because school interventions and practices that begin early can be effective in reducing the prevalence of absenteeism.

### Keywords

chronic absence; attendance; middle grades; achievement; four-year graduation; high school graduation; propensity methods

In their report, *The Importance of Being in School: A Report on Absenteeism in the Nation's Public Schools*, Balfanz and Byrnes (2012) estimated between 5 and 7.5 million children in the U.S. are chronically absent every year. Chronic absence is often defined as missing at least 10% of school days for any reason in a given year (e.g., Van Eck, Johnson, Bettencourt, & Johnson, 2017). Alternatively, in the 2016 report, *Chronic Absence in the Nation's Schools: An Unprecedented Look at a Hidden Educational Crisis*, the U.S. Department of Education defined chronic absence as missing at least 15 days of school in a school year. Some states have also set their definition of chronic absence at 15 days (Balfanz

& Byrnes, 2012). It has been found that chronic absence does not usually occur in one school year, but is often a pattern of attendance that develops over time with some children missing almost a month of school each year. Children who have been chronically absent during several school years can graduate high school having experienced an entire year less of instructional time than their non-chronically absent peers (Balfanz & Byrnes, 2012).

Despite this reality, children who are chronically absent are not commonly identified by schools. Average daily attendance (ADA) is more widely used and reported by schools even though chronic absence status may be a more significant indicator of student progress. Furthermore, schools may have high ADA while simultaneously having high, unidentified levels of chronic absence if absences are concentrated within a small number of students (Balfanz & Byrnes, 2012; Bruner, Discher, & Chang, 2011). Schools with ADA as high as 93–97% could be dealing with unidentified problems of chronic absenteeism (Bruner et al., 2011). In addition chronic absence is also a more accurate representation of school attendance than traditional truancy measures because it accounts for both excused and unexcused absences, an important distinction as research shows time in school, not reasons for absences, is what matters for students. The negative impacts of excessive absences occur regardless of reason (Balfanz & Byrnes, 2012; RI Data Hub, n.d).

In the current study, we further explored chronic absenteeism, particularly in the early middle grades, grades fourth through sixth, as an indicator of the potential for reduced achievement in eighth grade and as an early warning of high-school non-completion. We extended the limited body of chronic absence literature in a few ways: First, we employed the definition of chronic absenteeism, 15 days absent in a year, put forth by the U.S. Department of Education (U.S. Department of Education, 2016), which allowed us to test a lower threshold of absences than in many previous studies. Second, instead of looking only at dropout, we looked at four-year graduation by diploma, an outcome recently named as a Leading Health Indicator in Healthy People 2020 (Office of Disease Prevention and Health Promotion, n.d.). Next, we examined both the main effects of chronic absence and effects for subgroups including males, children of mothers who did not complete high school, and children with average or above parent involvement in first through third grades. We chose to look at subgroup effects because most studies do not identify for which groups chronic absence might be particularly disadvantageous. In doing so, we sought to provide information for the tailoring of targeted interventions to reduce chronic absenteeism and mitigate its harmful effects. Finally, this study is methodologically different than other chronic absence studies in that we employed not only Ordinary Least Squares (OLS) and probit regression, but also inverse-probability-weighting regression-adjustment (IPWRA) to address potential issues of selection.

## Review of Literature

### Chronic Absence

Although much research has been conducted on attendance and truancy, studies focusing specifically on the outcomes of chronic absence are less common. Chronically absent children experience lower levels of both math and reading achievement (Chang & Romero, 2008; Connolly & Olson, 2012; Gottfried, 2010; Moonie, Sterling, Figgs, & Castro, 2008;

Ready, 2010; Romero & Lee, 2007). In addition, chronic absenteeism increases the probability of high school dropout (Balfanz, Herzog, & Mac Iver, 2007; Mac Iver & Mac Iver, 2010; Ou & Reynolds, 2008; Schoeneberger, 2012), and decreases the probability of college enrollment and persistence (Balfanz & Byrnes, 2012; RI Data Hub, n.d). Differences in associations of chronic absence with outcomes by subgroups, such as student and family characteristics, have not been widely assessed, although Ready (2010) found that the impacts of chronic absence on outcomes may be larger for children in low-income homes. Some studies find that children who are chronically absent in early elementary school are more likely to have poor attendance later in school (Alexander, Entwisle, & Kabbani, 2001; Connolly & Olson, 2012; Sanchez, 2012).

## Middle-Grade Attendance

Chronic absence can be especially harmful when it occurs in the middle grades, grades fourth or fifth through eighth (Balfanz & Byrnes, 2006; Kieffer, Marinell, & Stephenson, 2011). During this period, the math achievement gap most readily develops (Balfanz & Byrnes, 2006; Beaton, et al., 1996). Children who miss many days of school in the middle grades may be missing out on key instructional time which serves to lay a strong foundation for advanced math in later grades.

Attendance during the middle grades is also critical to consider because this developmental period encompasses the transition from middle childhood to early adolescence (Eccles, 1999), a time of increasing autonomy when children begin to independently make decisions. Therefore, middle-grade attendance challenges are thought to be related to individual characteristics and decision making (Balfanz & Byrnes, 2012; McCluskey, Bynum, & Patchin, 2004; Thornberry, 1987). Over time, absence is believed to be less driven by child illness and more driven by child choice (Easton & Englehard, 1982). Viewed through this lens, absenteeism at this age is identified as a strong indicator of school disengagement and can serve as an early signal for future academic difficulties (Schoeneberger, 2012), including continued poor attendance (Balfanz & Byrnes, 2012; Balfanz et al., 2007) and school dropout (Balfanz et al., 2007; Janosz, Archambault, Morizot, & Pagani, 2008). This is likely due to the fact that engagement is considered a key driver of eventual dropout (Finn, 1989). Chronic absence in sixth and eighth grade is also associated with reduced probability of on-time high school graduation, defined as graduation by age 18 (Balfanz et al., 2007; Kieffer et al., 2011; Neild & Balfanz, 2006).

## Risk Factors for Absence

Risk factors for absenteeism can often be classified as individual-, family-, or school-related. Among individual risk factors for absence, children who experience maltreatment or trauma are more likely to miss large amounts of school (Barth, 1984; Dube & Orpinas, 2009; Kearney, 2008). Previous grade retention, special education participation, and other health factors have also been found to be associated with higher rates of absenteeism (Balfanz & Byrnes, 2012; Kearney, 2008; Sälzer, Trautwein, Lüdtke, & Stamm, 2012; Thomas, Lemieux, Rhodes, & Vlosky, 2011). In some studies, males have been more frequently truant than females (Veenstra, Lindenberg, Tinga, & Ormel, 2010; Sälzer et al., 2012), but these gender differences are not consistent (Balfanz & Byrnes, 2012). Individual motivation,

attachment, and other psychological factors, such as depression and anxiety, have also been found to be associated with absenteeism (Bools, Foster, Brown, & Berg, 1990; Dube & Orpinas, 2009; Veenstra et al., 2010).

Among family risk factors for absence, children from families with lower socio-economic status (SES) were at higher risk for chronic absenteeism in many studies (Balfanz & Byrnes, 2012; Ready, 2010; Romero and Lee; 2007). Others include age of mother at birth of child, education level of mother, and four or more children in the household (Romero & Lee, 2007; Balfanz & Byrnes, 2012). Higher parent involvement in school and increased parent expectations are associated with reduced absenteeism (Entwisle, Alexander, & Olson, 1997; Epstein & Sheldon, 2002; Ou & Reynolds, 2008). School quality and climate may also play a role. Schools with higher proportions of lower-achieving students or with high levels of violence have been found to have higher rates of truancy (Barth, 1984; Sälzer et al., 2012). Schools where students perceive the school climate as positive, where their work is displayed and expectations are high, have lower levels of absenteeism (Rutter, 1982; Van Eck et al., 2017).

## Present Study

This study examined the associations of chronic absence in the early middle grades with eighth-grade achievement and high school attainment in the Chicago Longitudinal Study (CLS, 2005a). The CLS follows a large, urban cohort of low-income, mostly African-American students, beginning in early childhood ($N$ = 1,539), who were at risk of school underachievement and dropout. Given that socioeconomic-based achievement and school completion gaps in the U. S. are 20 to 30 points and growing (National Assessment of Educational Progress, 2014; Ryan & Bauman, 2016), this cohort provides a unique opportunity to assess the impact on later educational outcomes of a policy-relevant, alterable influence while accounting for many other relevant predictors of these gaps during the early schooling process and within family contexts.

We theorized that educational skills acquired in the middle grades, particularly groundwork math skills necessary for more advanced math (Balfanz & Byrnes, 2006; Gottfried, 2010), are important for eighth-grade achievement. Therefore, missing a significant number of days during these years could be negatively associated with achievement outcomes. Eighth-grade achievement is an important outcome to consider because standardized eighth-grade achievement tests and exit exams have been previously identified as strong predictors for high school dropout (Franklin & Trouard, 2014).

We limited our analysis to chronic absence in the middle grades based on the work of several scholars who have defined this as an important period of development and a time when trajectories are set for school engagement and high school completion (Balfanz & Byrnes, 2006; Balfanz et al., 2007; Eccles, 1999; Kieffer et al., 2011). Absence at this age is more likely a function of student choice (Easton & Englehard, 1982). Narrowing the scope of our study to the middle grades allowed us to make grade-focused recommendations for preventive interventions, which may help to improve student engagement and promote good choices.

Based on previous studies, we also hypothesized that middle-grade chronic absence might be associated with lower rates of high school completion. We examined three measures of high school attainment: four-year graduation by diploma, graduation by diploma by age 21, and any high school completion by age 21. Many studies look at dropout, which does not consider whether or not individuals obtain a high school credential at a later time. As our interest is in the life course, we extended our measures to account for high school completion by age 21.

Four-year graduation by diploma is a newer measure to consider and is defined as graduation by traditional diploma, which is earned through the completion of course attendance at a secondary school (Cameron & Heckman, 1993) within four years of beginning ninth grade (Office of Disease Prevention and Health Promotion, n.d.). Students who take longer than four years to graduate high school may suffer delayed entry into the labor market. Although some delay in entering the labor market is valuable, that is the initial investment of time to obtain a high school diploma (Oreopoulos, 2007), the cost of remaining out of either the labor market or postsecondary education for more than the usual four-year investment of time likely reduces the lifetime earning capacity of these individuals (Rouse, 2007).

Labor-market entry delays are especially germane to consider for this largely African-American sample (93%), as African-American individuals transitioning to adulthood have been shown to experience delays in obtaining full-time employment with all types of high school completion when compared with their white peers. Possession of a high school diploma is strongly associated with increased labor-market participation, especially for African-American youth (McDaniel & Kuehn, 2013; Rouse, 2007). Moreover, students who complete high school with a traditional diploma experience better outcomes than those who dropout or complete by means of passing the General Education Development (GED) tests (Heckman, Humphries, & Mader, 2010). Four-year graduation by diploma could help to improve economic and health outcomes (Oreopoulos, 2007) for groups of individuals who are already at-risk for reduced well-being. In this study we sought to understand with which high school attainment outcome(s) chronic absence was most strongly associated, hypothesizing that it could be considered most economically detrimental for individuals if it was strongly associated with lower rates of four-year graduation by diploma.

As there is a dearth of literature examining the differential associations of chronic absence with outcomes by group, we also included examinations of associations by gender, mother's high school completion status, and parent involvement. Gender disparities have been found previously in mathematics achievement (Cornwell, Mustard, & Van Parys, 2013). Both gender and mother's education level have been identified as being associated with high school attainment outcomes (Ensminger & Slusarcick, 1992; Franklin & Trouard, 2014). For this sample, gender was of particular concern because African-American males experience larger disparities in education outcomes than any other group of students in the U.S. (Kena et al., 2015). If we could establish that males are more at risk for detrimental impacts associated with chronic absence, a clearer target for attendance interventions in the middle grades would be identified. Additionally, if parent involvement in the early years serves to moderate the impact of later chronic absence, a need for programs to increase parent involvement would be highlighted.

We address the following questions:

1. Do students who are chronically absent in the early middle grades experience lower levels of achievement in eighth grade and lower rates of high school completion than students who are not chronically absent?
2. Do the associations of chronic absence with these study outcomes vary by gender, mother's high school completion status, or level of parent involvement in first through third grades?

## Method

### Data and Sample

Data were drawn from the CLS, a prospective cohort of children who entered kindergarten in Chicago Public Schools in 1985. The majority of children ($n$ = 989) attended a Child-Parent Center (CPC) program while the remaining children ($n$ = 550) attended all-day kindergarten in other comparable Chicago Public Schools. CPC is a P-3 school reform model synthesizing high-quality preschool with other elements such as parent involvement, small classes, and professional development (Reynolds, 2000; Reynolds, Hayakawa, Candee, & Englund, 2016). In the original study, schools were matched at the school level. Subsequently, CPC and comparison children were compared on key characteristics for baseline equivalence. Program and comparison groups were largely equivalent.

The sample for the present study included 1,148 students, who had attendance ratings in grades 4–6. All students with attendance ratings also had scores for at least one of the outcome measures. Baseline characteristics were re-examined to compare the study sample to the attrition sample. Table 1 shows the characteristics of the original CLS sample, the study sample, and the attrition sample. The children in the study sample were more likely to have participated in the CPC follow-on program in grades first through third ($d$ = .19), less likely to have experienced adverse childhood experiences from ages birth to five ($d$ = −.15), and more likely to be eligible for subsidized meals ($d$ = .19). Therefore, the study sample may be slightly more disadvantaged than the attrition sample. The two samples were statistically similar on all other key characteristics. Table 2 shows key variables for the study sample. If a student did not have outcome data, they were dropped from the analysis for that outcome. The analytic sample sizes were as follows: eighth-grade reading and math achievement analyses ($n$ = 1,113); four-year graduation by diploma ($n$ = 1,070); graduation by diploma by age 21 ($n$ = 1,051); and any high school completion by age 21 ($n$ = 1,054).

Table 3 shows differences between chronically and non-chronically absent children on key characteristics. Children who were chronically absent were more likely to be male ($d$ = −.20), lower income (Aid to Families with Dependent Children [AFDC] participation, $d$ = −.26; subsidized meals, $d$ = −.22), children of non-employed mothers ($d$ = −.17) and of mothers who did not complete high school ($d$ = −.33). They also scored slightly lower on the cognitive composite at kindergarten entry ($d$ = .19). These between-group differences were accounted for by including these characteristics as covariates in the analyses.

### Chronic Absence Measure

Following established procedures in the CLS (Ou, Mersky, Reynolds, & Kohler, 2007; Ou & Reynolds, 2008), chronic absence was measured by ratings from classroom teachers in fifth and sixth grades and supplemented with parent reports collected in fourth and sixth grades. Teachers rated the attendance of students based on the daily attendance records they kept for each child in their classrooms. The attendance ratings assigned were part of larger annual teacher surveys and occasional parent surveys of school experiences. Individual, official administrative records of absences were not available in the CLS for the elementary grades, and at the time of the study, only ADA was routinely reported by schools.

As daily observers of children's school participation and performance, teachers are an important and valid source of information about attendance and behavioral adjustment (Hightower et al., 1986; Reynolds, 1999, 2000). The three teacher- or parent-rated indicators for attendance were not only significantly associated with each other and with child outcomes in the expected magnitude (*r*s in the range of .22 to .30), but they showed construct distinction from other behaviors and experiences such as global classroom adjustment, achievement, and parent and teacher expectations of performance (Ou & Reynolds, 2008).

Using classroom records, the teachers rated the attendance of students. The sixth-grade attendance measure was based on teachers' ratings of each student on the statement, "Please rate the above named child on numbers of absences during the school year" (CLS, 2005b, p. 8). Responses were 1 (*0–3 days*), 2 (*4 to 7 days*), 3 (*8 to 12 days*), 4 (*13 to 20 days*), and 5 (*more than 20 days*). The fifth-grade attendance measure was based on teachers' ratings of each student on the statement, "Please rate the above named child on the characteristic, attends school" (CLS, 2005b, p. 7), where the scale was 1 (*poor, not at all*), 2 (*below average/some*), 3 (*average/satisfactory*), 4 (*above average/good*), and 5 (*excellent/much*). We reverse coded this item to match the direction of the scale on the 6$^{th}$ grade measure. For the fourth-to-sixth grade measure, parents rated their child on the item, "How often does your child stay home from school?"(CLS, 2005b, p. 13), where the scale was 1 (*never*), 2 (*once a month*), 3 (*once a week*), 4 (*2 or 3 times a week*) and 5 (*nearly every day*).

For the constructed attendance measure, the average of the teacher attendance ratings in fifth and sixth grades was first calculated and assigned to each child. If a child had only one of these teacher ratings, they were assigned that value. These teacher ratings from fifth and sixth grade accounted for 92% of the values (70% of the original CLS study sample). If a child was missing both the fifth- and sixth-grade teacher ratings, the parent report was used (6% of the original CLS sample). Children missing all three reports (24% of the original CLS sample) were coded as missing and were dropped from the analyses. Because imputation of missing reports with the Expectation-Maximization (EM) algorithm (Schafer & Olsen, 1998) did not alter findings, we kept the attendance measure in its original form.

Values on the constructed attendance measure ranged from 1 to 5, where 1 represented the best rating for a child's attendance and 5 represented the worst. Using this constructed attendance rating, we then created a dichotomous measure for chronic absence. Children rated 3.5 or higher on the constructed attendance measure were coded 1 for chronic absence

in grades 4–6, which, based on the sixth-grade rating choices, corresponded to an average of 14 or more days missed based on the sixth-grade scale, and was similar to the 15 days absent definition, or approximately 8% of school days for a typical enrollment period of 180 days. Children below 3.5 on the constructed attendance measure were coded 0 for non-chronically absent (Ou et al., 2007; Ou & Reynolds, 2008).

We chose the 3.5 cut point for two reasons. First, on the reverse-coded, fifth-grade measure a rating of 3 represented satisfactory or average attendance. We wanted the dichotomous measure to capture children who had poorer-than-average attendance, so it was necessary to set the cut-point higher than 3.0. If only the fifth-grade measure was available, we wanted to be sure that children rated as average attenders by their teachers were not coded on the dichotomous measure as chronically absent. We recognize that setting the cut-point at 3.5 may have omitted some children who were chronically absent based on the parent measure, but children for whom only the parent measure was available represented a small percentage of the study sample (6%). A rating of 3.5 on the constructed measure was approximately a one standard deviation difference from the mean, further ensuring that this cut-point would capture children with worse-than-average attendance on the dichotomous measure. The percentage of CLS participants who met this definition for chronic absence (3.5 or higher) was 15%, which is consistent with estimated rates of chronic absence reported in the literature (Balfanz & Byrnes, 2012). Two alternative definitions of chronic absence using cut points at an average of 3 and 4 on the constructed attendance measure were also created. The frequency distributions for these alternate constructions of the chronic absence measure can be found in Appendix Table 1.

## Outcome Measures

**Eighth-grade achievement—**Reading and math achievement in the eighth-grade year were measured using subtest scores from the Iowa Tests of Basic Skills (ITBS; Hieronymus & Hoover, 1990; Hieronymus, Lindquist, & Hoover, 1980). The reading subtest had 58 items (KR-20 reliability = .92) and focused on passage comprehension. The math subtest had 117 items (KR-20 reliability = .95) and focused on concepts, computation, and problem solving (Reynolds, 2000). The test was administered in group format each April, making it an appropriate end-of-year achievement measure. Administration of the test was supervised by Chicago Public School's central office and was therefore independent of a child's CPC status (Reynolds & Temple, 1998).

**High school attainment—**According to a report by Mikulecky (2013) for the Education Commission of the States, most states have set a maximum age at which individuals can participate in public education. Twenty-seven states, including Illinois, have set the maximum age at 21, so we capped our high school attainment measures at December 2001, when most of the CLS participants would have turned 21. In our study, students obtained a high school credential through one of two pathways: They completed a standard or an alternative sequence of courses (as defined by their Individual Education Program [IEP]) and graduated with a diploma awarded by their school district or they completed the GED battery of tests. Using these pathways to the high school credential, we coded three measures of high school attainment. For four-year graduation by diploma, any participant

who was reported as graduating high school with a diploma awarded for the completion of courses within four years after beginning ninth grade was coded as 1. All others were coded as 0. For high school graduation by diploma by age 21, participants who completed high school courses and were awarded a diploma by age 21 were coded as 1. All others were coded as 0. For any high school completion by age 21, participants were coded as 1 if they completed high school by any means by age 21, that is by diploma or GED. Participants who did not complete high school by any means were coded as 0.

## Covariates and Explanatory Variables

**CPC program participation—**Individuals who participated in a CPC preschool program for either one or two years beginning at age 3 were coded as 1. Those who did not participate in CPC preschool were coded as 0 and they enrolled in a comparison site or CPC in kindergarten. Of these comparison children, 15% attended Head Start preschool. The other children had no preschool experience. For any follow-on participation, children who participated in CPC services at any time in first to third grade were coded 1. If they did not participate they were coded 0. The follow-on program was open to any child who enrolled in one of the CPC schools.

**Gender and race/ethnicity—**Gender was coded 1 for males and 0 for females. Race/ethnicity was coded 1 for African-American and 0 for Latino or other.

**Child and family demographic risk factors—**Included risk factors were (a) low birth weight, (b) location of school in high-poverty area, (c) single-parent family status by child's third birthday, (d) mother's age under 18 at birth of child, (e) mother not employed by child's third birthday, (f) mother did not complete high school by child's third birthday, (g) four or more children in the family, (h) participation in AFDC by child's third birthday, and (i) eligibility for subsidized meals at preschool entry. Data for school-area poverty and race were obtained from school administrative data. Family characteristics (e.g., parent education, single-parent status) were obtained from school records, retrospective parent reports collected when the children were in elementary school, or from birth records (Reynolds, 2000; Reynolds & Ou, 2011). Each of these risk factors was coded individually. For all factors, presence of the risk was coded as 1. If a child did not possess that risk, they were coded as a 0. A variable was included in all analyses to control for differences between children who had imputed risk data and those who did not. Children with imputed data were coded as 1 and those with no imputed data were coded as 0.

A measure for Adverse Childhood Experiences (ACEs) was also included. These ACEs scores were developed for a 2016 study using survey data collected from participants between ages 22 and 24. A score was assigned to each participant based on their retrospective report of nine traumatic childhood experiences, including death of a family member, parent substance abuse, witness to a shooting or stabbing, and frequent family conflict. In addition, for some individuals who did not complete the survey, administrative reports on childhood maltreatment were used to assign an ACE score (Giovanelli, Reynolds, Mondi, & Ou, 2016). For this analysis, the score was dichotomoized into 2 or more ACEs, birth to age 5 versus 1 or no ACEs.

## Elementary school variables

**Cognitive and achievement variables—**The cognitive composite at kindergarten entry included scales for word analysis, vocabulary, math, and listening subtests on the ITBS (Hieronymus & Hoover, 1990; Hieronymus, Lindquist, & Hoover, 1980). Tests were administered at the beginning of the kindergarten year (Reynolds & Temple, 1998). Each subscale had 30 items. Internal consistency reliability was .94. The third-grade reading and math scores were also derived from the ITBS (Hieronymus & Hoover, 1990; Hieronymus, Lindquist, & Hoover, 1980). The reading comprehension subtest in third grade included 47 items (reliability = .92). The math test included 101 items (reliability = .94). The tests were administered in April of the third-grade year (Reynolds & Temple, 1998).

**Social-emotional maturity, first through third grade—**In each grade, teachers rated individual children on school progress and classroom adjustment on approximately 20 items. The indicators varied from year to year, but in first grade one example was, "came to my class ready to learn" (CLS, 2005b, p. 3). Ratings on each indicator were on a five-point scale where 1 was "*poor/not at all*" and 5 was "*excellent/much*." Results of a principal components analysis indicated that six items formed a socio-emotional adjustment scale, which was similar across grades (Niles, Reynolds, & Nagasawa, 2006). The measure included in this study was an average of the child's social-emotional maturity scores for grades first through third. The correlations of the three ratings were in the .50 range and internal consistency reliability for the scale was .92 (Reynolds, Mavrogenes, Bezruczko, & Hagemann, 1996). This scale was previously published in Reynolds et al. (1996).

**Ever retained, first through third grade—**Data were obtained from school records. If a child had any record of being retained in a grade from first through third grade they were coded as 1. If there was no record of retention they were coded as 0.

**Ever placed in special education, first through third grade—**Also obtained from school records, this was a dichotomous measure created from a variable which summed the number of years a child was placed in special education from first through third grade. If a child had any record of being placed in special education during those years they were coded as 1 and as 0 otherwise.

**Two or more school moves, kindergarten through fourth grade—**If a child changed schools two or more times from kindergarten to fourth grade they were coded as 1. If a child changed schools once or not at all they were coded as 0.

**Average teacher-rated parent involvement, first through third grade—**Each year in grades first through third teachers were asked to rate parents on the item "parent(s) participate(s) in school activities" (CLS, 2005b, p. 3–5) on a scale from 1 to 5 where 1 was "*poor/not at all*" and 5 was "*excellent/much*." The scores for grades 1–3 were then averaged. If a child was missing data for one of the three time points, the two available time point scores were averaged. If a child was missing data for two of the time points, then the available year was used as the child's score. Previous studies have found this to be a reliable measure of parent involvement (Hayakawa, Englund, Warner-Richter, & Reynolds, 2013;

Reynolds, 2000). For the subgroup analyses, a dichotomized version of this variable was created where 1 was equal to or above the average and 0 was below the average on this measure.

**School quality in fourth grade—**If a child attended a school in fourth grade where the reading and math proficiency rate on national norms of the ITBS was above 25%, they were assigned a 1 on this measure. All others were coded 0. As an indicator of school quality, school-level achievement has been found in previous studies to be a valid and measure of the within-school learning context that is predictive of educational achievement, attainment, and broader well-being (Ou & Reynolds, 2008; Reynolds & Ou, 2011).

**Juvenile justice system involvement—**Juvenile crime records were obtained from administrative sources, including Cook County Juvenile Court and two other Midwest locations. Juvenile arrest included formal petitions for children who were arrested and processed through juvenile courts. Individuals were coded 1 if they had a record of arrest and 0 otherwise (Arteaga, Humpage, Reynolds, & Temple, 2014).

## Data Analysis

**Model specifications—**Unadjusted differences in eighth-grade achievement and high school attainment were examined using t-tests. Additionally, multiple regression methods were used to assess differences in these outcomes when adjusting for covariates. Linear regression was used for continuous achievement outcomes and probit regression for dichotomous high school attainment outcomes. All models contained the focal variable, chronic absence status in the middle grades. Risk factors for chronic absence and predictors of achievement and high school attainment were also included based on findings of previous studies. Covariates were limited in time to occurring mostly in or before fourth grade and included the following: (a) CPC preschool and follow-on (grades first through third) program participation; (b) race, gender, and low birth weight; (c) the set of CLS-defined risk factors including participation in AFDC, eligibility for subsidized meals, school in high-poverty area, mother's age at child's birth, mother's high school completion status, mother's employment status by child's age 3, single-parent home by child's age 3, four or more children in the home, and an indicator of imputation for any of these risk factors; (d) ACES, birth-to-age-five score; (e) more than two school moves from kindergarten through fourth grade; (f) the cognitive composite variable measured at kindergarten entry; (g) school quality in grade four (as a proxy for elementary school quality); (h) the first-through-third-grade variables including parent involvement, any special education placement, and socio-emotional maturity; and (i) ever-retained status in kindergarten through third grade.

In addition, for the eighth-grade math and reading achievement models, we included the standardized measure of third-grade math achievement or reading achievement, respectively. We also included the third-grade math score in the models for the high school attainment outcomes. Standard errors were clustered at the site level to address potential issues of nesting. After running regression models, marginal effects were calculated and reported for the probit regressions. Standardized effect sizes were calculated as Cohen's d values using Equation 1:

$$d = \frac{M_1 - M_2}{SD_{pooled}} \quad (1)$$

**Missing data—**Given the extensive longitudinal data collection from different sources, we used the EM algorithm with maximum likelihood (ML; Schafer & Olson, 1998) to impute missing data for the following predictors and covariates: cognitive composite, third-grade achievement, demographic risk indicators, socio-emotional maturity, and school quality. As a single-estimate approach, the EM algorithm has been shown to produce unbiased estimates of standard errors (Cheema, 2014; Graham, 2012), especially with modest amounts of missing data and a well-documented understanding of the missing-data process, as shown in the extensive data collection in the CLS cohort (Reynolds et al., 2011). The percentage of cases imputed for a particular variable ranged from 5% to 25%, with data missing at random. The pattern of findings was similar for imputed and non-imputed variables, although power was increased for the models with imputation.

**Potential selection bias and propensity score analysis—**As discussed earlier, there was not equivalence between chronically and non-chronically absent children on some control variables at baseline. This raised concerns of possible selection or omitted variable bias, meaning that the outcome variable in each model and chronic absence status both may be influenced by one or more of the control variables or by some other unmeasured variable (Cook & Steiner, 2010). To address this, exploratory models were run to estimate if any of the control variables in the achievement and high school outcome models might also predict chronic absence status. Results showed the only significant predictor of chronic absence among the baseline control variables was mother's high school completion status. This lessened concerns about potential selection to treatment in the models. Additionally, inclusion of the rich set of control variables significantly reduced concerns about selection and enabled the estimates to be viewed as trustworthy (Rosenbaum & Rubin, 1983; Steiner, Cook, Shadish, & Clark, 2010).

To further account for the possibility of selection, and to check the robustness of the estimates generated by the OLS and probit models, IPWRA estimates were generated. First, the probability of the observed treatment status (i.e., a child's chronic absence status) was calculated based on a series of background characteristics. Regression coefficients were then weighted using the inverse of these calculated probabilities. Weighting by the inverse probability of the observed chronic absence status allowed observations with low probability of their observed status to receive higher weight in the regressions. For example, a child who was chronically absent when, based on baseline characteristics, he had a low probability of being chronically absent received more weight in the regression. This minimizes selection bias that might result from differences in baseline background characteristics. Once inverse probability weights were applied, average predicted outcomes for each treatment level, chronically and non-chronically absent, were generated. For each study outcome, the differences between the average predicted outcomes, for chronically and non-chronically absent status, provided estimates of average treatment effect (ATE; StataCorp, 2013).

In IPWRA, separate models are specified to predict treatment status (chronic absence) and outcomes. For this analysis, the model specified to predict the probability of chronic absence included CPC program participation, demographic and risk factors, and school-age indicators through third grade. The models predicting the eighth-grade achievement outcomes also included these variables, but school-age variables were extended to include grades up to eighth. The models predicting the high school attainment outcomes saw the addition of an eighth-grade achievement variable and a dichotomous indicator of juvenile justice system participation. The specification of separate models for treatment and outcomes introduced a doubly-robust property into the analyses because only one of the models specified, either treatment or outcome, had to be correct for the estimates to be considered reliable (Richardson, Reynolds, Temple, & Smerillo, 2017; Robins and Rotnitzky, 1995; Wooldridge, 2007). Although we were confident in the predictors of the eighth-grade achievement and high school attainment outcomes based on predictor studies that have been previously completed (Ou & Reynolds, 2008; Reynolds & Temple, 1998), there was some uncertainty about the predictors of chronic absence. The doubly-robust property allowed for this uncertainty and still produced what could be considered reliable estimates of ATE.

**Subgroup differences—**To understand if there were heterogenous associations of chronic absence with outcomes, models with single interaction terms were run, as well as subgroup analyses on subsamples. Subgroup analysis is more flexible than the inclusion of single interaction terms in that it allows coefficients on all covariates to vary across groups. The results produced by subgroup analyses are similar to those produced by including interactions of the grouping variable, e.g. gender, with all other model covariates. In our analyses, we believed the associations of some of the covariates with outcomes might be different for males compared to females or for children of moms who completed high school compared to those who did not. Subgroup analyses accommodated for these variations. The models would have become quite large if interaction terms of the grouping variable with all other covariates were included. Subgroup analysis prevents the models from becoming unwieldy, while still allowing for the coefficients on all covariates to vary for different groups. Separate standardized effect sizes were then calculated allowing magnitudes of associations to be compared across groups (Heckman et al., 2010; Heckman & LaFontaine, 2006). We borrowed this idea from the health intervention literature which recommends relying on significance tests from the inclusion of interaction terms, but also finds value in being able to quantify the differential impacts of treatment or differential associations across groups (Rothwell, 2005). While different from the inclusion of a single interaction term, the information provided by subgroup analyses can be valuable for the development of targeted interventions. Given the intervention orientation of this study, using this approach was useful, particularly for the probit models, as the practical interpretation of marginal effects on interaction terms in non-linear models is not straightforward (Karaca-Mandic, Norton, & Dowd, 2012).

## Results

Table 4 shows the unadjusted achievement means and unadjusted rates of high school attainment by chronic-absence status. Children who were chronically absent in the middle grades scored lower on measures of reading and math achievement at the end of eighth grade compared to children who were not chronically absent ($p < .001$). Additionally, the chronically absent group had lower rates of four-year graduation by diploma, as well as graduation by diploma by age 21 and any high school completion by age 21. The extent to which these descriptive patterns hold after accounting for the predictors of chronic absence, achievement, and attainment is addressed below.

### Chronic Absence and Achievement

As reported in Table 5, middle-grade chronic absence was negatively associated with eighth-grade math achievement. When all other factors in the model were held constant, children who were chronically absent scored, on average, two months behind their non-chronically absent peers on measures of math achievement, $\beta = -2.93$, $p = .01$, 95% CI [−4.86, −.99]. However, this was a small effect, $d = -.17$. The impact on reading achievement at the end of eighth grade was also negative, but was non-significant with a very small effect size, $\beta = -.68$, $p = .57$, $d = -.03$, 95% CI [−3.10, 1.74].

Although chronic absence yielded mixed results, other negative predictors of both reading and math achievement included race, eligibility for subsidized meals, special education placement, and grade retention in the early grades. Those with positive associations with achievement included the cognitive composite at kindergarten entry, third-grade achievement, and social-emotional maturity. The explanatory power of the models was high ($R^2$ = 57–67%).

### Chronic Absence and High School Attainment

Marginal effects calculated from probit regression indicated that chronic absence in the middle grades was associated with a reduced probability of four-year graduation by diploma of about 18 percentage points, $p < .001$, $d = -.37$, 95% CI [−.26, −.10]. Additionally, chronically absent children had a 17 percentage point lower probability of graduation by diploma by age 21, $p < .001$, $d = -.35$, 95% CI [−.24, −.11], and about an 11 percentage point lower probability of any high school completion by age 21, $p < .01$, $d = -.23$, 95% CI[−.18, −.04]. Other predictors significant to all high school attainment outcomes were (a) gender, (b) mother's high school completion status, (c) AFDC participation, (d) ACEs, (e) school quality in fourth grade, (f) third-grade math achievement, and (g) socio-emotional maturity in early elementary school. Full models and coefficients can be found in Table 5.

### Robustness Using IPWRA and Alternative Definitions of Chronic Absence Status

Table 6 shows that IPWRA methods produced results consistent with the multiple regression results for all outcomes. This reduced concern about potential selection in the OLS and probit models. Middle-grade chronic absence was associated with lower scores for eighth-grade math achievement ($d = -.17$) and reduced probability of four-year graduation by diploma ($d = -.36$), graduation by diploma by age 21 ($d = -.37$), and any high school

completion by age 21 ($d = -.27$). As in the OLS estimate, IPWRA analysis indicated the association with eighth-grade reading achievement was non-significant and very small ($d = .04$).

Alternative thresholds for the chronic absence measure yielded similar patterns of results. Results for all five key outcomes using the alternative definitions of chronic absence can be found in Appendix Table 2. There is some evidence that exploration of a lower threshold of days absent is warranted.

## Subgroup Analyses

Table 7 indicates for most subgroups, associations of chronic absence with eighth-grade reading achievement were very small ($d < -.10$). For all high school attainment outcomes, the effect sizes were larger for males than females. For four-year graduation by diploma, the effect size was −.48 for males versus −.24 for females. The same pattern held for graduation by diploma by age 21 and any high school completion by age 21, with associations for males being nearly double the size of those for females. Chronic absence seems to present a greater threat to the probability of attaining a high school credential for males than females. The magnitude of the associations of chronic absence with eighth-grade math achievement was nearly equal for males ($d = -.16$) and females ($d = -.18$). For males, all associations, except reading, were significant at the $p < .05$ level. For females, the associations were significant for four-year graduation and graduation by diploma.

The analyses by mother's high school completion status compared children whose mothers did not complete high school to children whose mothers did complete. The associations of chronic absence with outcomes for children of completers were generally larger in magnitude than the associations for those whose mothers were non-completers. For eighth-grade math achievement, the magnitude of the effect size for children of completers was −.23 versus −.14 for children of non-completers. For four-year graduation by diploma and graduation by diploma by age 21, the effect sizes for children of high school completers were also larger than those for children of non-completers. The associations of middle-grade chronic absence with any high school completion by age 21 were both negative and nearly identical in magnitude for children of high school completers and non-completers (males, $d = -.23$ and females, $d = -.21$). The associations with math achievement and the high school attainment outcomes were all significant, except for the association with any high school completion by age 21 for children of completers.

For eighth-grade math achievement, the effect sizes were similar for children with parents who had average or above involvement ($d = -.15$) and below-average involvement ($d = -.18$). Two of the three high school attainment measures indicated that children with below-average parent involvement might be more detrimentally impacted by chronic absence than children whose parents were more involved. The association of chronic absence with four-year graduation by diploma for children with less-involved parents ($d = -.44$) was significantly larger than the association for children of more-involved parents ($d = -.27$). So, for children of less-involved parents, chronic absence seems to pose a greater threat to the probability that they will graduate in four years with a diploma. A similar pattern was found for any high school completion by age 21. In this case the magnitude of the association was

$d = -.30$ for children of parents with low involvement versus $d = -.10$ for children of more-involved parents. For children with below-average parent involvement, all of these associations were significant at the $p < .05$ level. For children of parents who had been more involved, four- year graduation by diploma and any high school completion by age 21 were statistically significant associations.

Single interaction terms were added to full models as well. The inclusion of single interaction terms in each model, where chronic absence was interacted with each of the grouping variables, that is gender and mother's high school completion status, allowed the slope for chronic absence to vary while holding all other coefficients in the models constant. The only interaction which approached significance under this constraint was the interaction of gender and chronic absence in the model predicting probability of four-year graduation by diploma ($p = .07$).

## Discussion and Implications

This study assessed the association of chronic absence in the middle grades with eighth-grade achievement and high school attainment. The goal was to provide information that might be useful for the development of interventions. We hypothesized that missing many days of school during this critical period of development may be negatively associated with eighth-grade achievement. Results indicated that although there was no significant association of chronic absence with reading achievement in eighth grade, there were small and negative associations with eighth-grade math achievement. Based on the work of Balfanz and Byrnes (2006) and Beaton et al. (1996), and on our own findings about the associations with high school attainment, we expected that missing many days of school in the middle grades would have a much more significant impact on achievement, but this was not the case. The non-significant association with reading achievement is surprising based on other studies which have found impacts on reading (e.g. Gottfried, 2010). One possible explanation is that there may not have been as strong a literacy focus in the middle grades as in earlier grades at the time of the study, so missing instructional time in the middle grades may not be have been as detrimental to literacy outcomes. It was also unexpected that the associations with math achievement were not larger in magnitude, particularly because the associations with high school attainment were much larger. Further research will help us to identify if there are other skills that are impacted by the reduced instructional time that occurs with chronic absence in the middle grades, or if pathways beyond achievement are important to consider when attempting to understand the path through which chronic absence reduces high school attainment.

Consistent with our expectations, and with the previous literature (Balfanz et al., 2007), children who were chronically absent in the middle grades experienced reduced probabilities of completing high school. Analyses of high school attainment outcomes showed that middle-grade chronic absence was most strongly associated with reduced probability of four-year graduation by diploma and graduation by diploma by age 21. Given that recipients of GEDs do not experience the same economic prosperity as individuals who obtain a diploma (Heckman et al., 2010), this should be of concern. Four-year graduation and the high school diploma are most likely to produce the best outcomes for individuals. These

results highlight the need for interventions to address chronic absence to change the trajectories of students before they finish the middle grades and enter high school.

When subgroups were examined, the associations of chronic absence with outcomes were larger in magnitude and more significant for males than females and for children of parents with lower levels of parent involvement. This finding is an addition to the literature, as males have not previously been identified as being particularly at risk for the detrimental associations of chronic absence with outcomes. This finding provides guidance for intervention development. In particular, we believe it may be especially important to monitor the attendance of male children in the middle grades. The literature has established that males are already at-risk for reduced achievement and increased likelihood of high school dropout (e.g. Cornwell, et al., 2013; Ensminger & Slusarcick, 1992). Chronic absence in the middle grades may compound this risk. Van Eck et al. (2017) suggested that student perceptions of school climate play an important role in school attendance decisions. Interventions which seek to improve school engagement for boys in the middle grades may be of particular importance in helping to prevent chronic absenteeism for a more vulnerable group. Additionally, based on the finding that parent involvement seemed to mitigate some of the effect of chronic absence, interventions to promote parent involvement in the early elementary grades should be emphasized.

That chronically absent children of mothers who completed high school experienced poorer outcomes may be attributable to the fact that chronic absence may remove the advantage these children would have otherwise experienced or it may indicate some downward bias in the estimates for the chronically absent children of non-completers. For children of whose mothers did not complete high school, some of the impact of chronic absence on outcomes may be masked or confounded by other risk factors. Additional analysis is needed to better understand the heterogeneous impacts of chronic absence for these groups. Future research directed towards crystallizing the differential impacts of chronic absence for subsamples of students will help to direct limited public dollars for interventions towards the students who will most likely benefit. Additionally, more research on the specific threshold number of days absent where negative associations become larger in magnitude is recommended.

Among the interventions and reform initiatives that have been found to promote attendance and school engagement are the mentoring programs Check and Connect (Christenson & Sheridan, 2001; Christenson, Stout, & Pohl, 2012; Christenson & Thurlow, 2004) and Big Brothers Big Sisters (Valentino & Wheeler, 2013), the 5 Essentials model of school organization (Bryk, Sebring, Allensworth, Luppescu, & Easton, 2010), the Child-Parent Center Preschool to 3rd Grade Program (Reynolds et al., 2016), full-day preschool (Reynolds et al., 2014), and Small Schools (Oxley, 2007). Many of these evidence-based interventions emphasize increasing student and family engagement in school. These and other planful efforts can provide principals, teachers, and school leaders with a variety of useful strategies for preventing chronic absences. The ultimate goal of any of these interventions is to improve attendance and thus improve children’s academic outcomes, putting them on a trajectory for economic success and good health throughout the life course.

These findings add to the limited, but growing body of research on chronic absence and emphasize the need for schools to collect not only ADA data, but to use attendance data to identify which children are chronically absent. This will equip administrators and teachers to tailor the most effective interventions to prevent and remediate chronic absenteeism. A chronic absence focus could enable schools to work with particular families to identify specific barriers to attendance and implement targeted interventions. Targeted school programs that increase student and family engagement are valuable tools in preventing chronic absence and increasing the likelihood of student success and positive life course outcomes.

## Limitations

There are three notable limitations. First, while the findings significantly add to our understanding of the associations of chronic absence with key outcomes for children and youth, the findings may not be generalizable to other student populations and more economically diverse contexts. However, the influence of absences and other alterable factors within high-risk urban contexts such as in the CLS is of high policy relevance in addressing persistent racial and socioeconomic achievement gaps.

Second, our measure of chronic absence was based primarily on teacher reports rather than school records. Although school records are also fallible indicators, the use of teacher ratings may have introduced bias in reports, including social desirability or “halo” effects that weaken construct validity. Consequently, our results warrant cautious interpretation. Nevertheless, the measure has a number of strengths that enhance validity. We used multiple sources of ratings over time and in different years, the evidence from correlational analyses showed construct distinction consistent with studies using school records (Entwisle et al., 1997), and estimates of impact were derived from a comprehensive model in which the influence of many other indicators of performance and adjustment from different sources were taken into account.

Finally, while robustness checks utilizing inverse-probability-weighting help to account for some of the potential, cautious interpretations are warranted. Continued examination of absence measures with additional educational attainment outcomes and measures of economic well-being will enhance understanding about impacts and the processes that contribute to long-term effects.

## Summary and Conclusion

Using OLS, probit, and propensity weighting methods, we found that chronic absence in the middle grades was significantly associated with lower math achievement and lower rates of high school attainment. In particular, chronic absence was most negatively associated with the probability of four-year graduation by diploma and graduation by diploma by age 21, putting individuals at greater risk for negative economic and health outcomes. These findings highlight the need for schools to identify students who are chronically absent, as chronic absence is often a problem hiding in plain sight. In addition, the importance of developing interventions which both improve student engagement and promote family

involvement is magnified. Increased use of evidence-based strategies, however, provides a strong foundation for further advances.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

## Acknowledgments

The research for this study was supported by the National Institute of Child Health and Human Development (R01HD034294) and the Foundation for Child Development.

## References

Alexander KL, Entwisle DR, Kabbani NS. The dropout process in life course perspective: Early risk factors at home and school. Teachers College Record. 2001; 103:760–822. DOI: 10.1111/0161-4681.00134

Arteaga I, Humpage S, Reynolds AJ, Temple JA. One year of preschool or two: Is it important for adult outcomes? Economics of Education Review. 2014; 40:221–237. DOI: 10.1016/j.econedurev.2013.07.009 [PubMed: 26823640]

Balfanz R, Byrnes V. Closing the mathematics achievement gap in high-poverty middle schools: Enablers and constraints. Journal of Education for Students Placed at Risk. 2006; 11:143–159. DOI: 10.1207/s15327671espr1102_2

Balfanz R, Byrnes V. The importance of being in school: A report on absenteeism in the nation's public schools. Education Digest: Essential Readings Condensed for Quick Review. 2012; 78:4–9. Retrieved from http://web.a.ebscohost.com/ehost/pdfviewer/pdfviewer?sid=7d73fab5-f958-45fd-b605-43da33a34dea%40sessionmgr4008&vid=1&hid=4201.

Balfanz R, Herzog L, Mac Iver DJ. Preventing student disengagement and keeping students on the graduation path in urban middle-grades schools: Early identification and effective interventions. Educational Psychologist. 2007; 42:223–235. DOI: 10.1080/00461520701621079

Barth RP. Reducing nonattendance in elementary schools. Children & Schools. 1984; 6:151–166. DOI: 10.1093/cs/6.3.151

Beaton AE, , Mullis I, , Martin MO, , Gonzalez E, , Kelly D, , Smith TA. Mathematics Achievement in the Middle School Years. IEA's Third International Mathematics and Science Study (TIMSS) Boston: Center for the Study of Testing, Evaluation, and Educational Policy; 1996 Retrieved from http://timss.bc.edu/timss1995i/TIMSSPDF/amtimss.pdf

Bools C, Foster J, Brown I, Berg I. The identification of psychiatric disorders in children who fail to attend school: A cluster analysis of a non-clinical population. Psychological Medicine. 1990; 20:171–181. DOI: 10.1017/S0033291700013350 [PubMed: 2320695]

Bruner C, , Discher A, , Chang H. Chronic elementary absenteeism: A problem hidden in plain sight 2011 Retrieved from Attendance Works website: http://www.attendanceworks.org/research/

Bryk AS, , Sebring PB, , Allensworth E, , Luppescu S, , Easton JQ. Organizing schools for improvement: Lessons from Chicago Chicago: University of Chicago Press; 2010

Cameron SV, Heckman JJ. The nonequivalence of high school equivalents. Journal of Labor economics. 1993; 11:1–47. DOI: 10.1086/298316

Chang HN, , Romero M. Present, engaged, and accounted for: The critical importance of addressing chronic absence in the early grades 2008 Retrieved from National Center for Children in Poverty website: http://www.nccp.org/publications/pub_837.html

Chicago Longitudinal StudyChicago Longitudinal Study: A study of children in the Chicago Public Schools, user's guide Madison: University of Wisconsin-Madison, Waisman Center; 2005a

Chicago Longitudinal StudyChicago Longitudinal Study: A study of children in the Chicago Public Schools, study instruments Madison: University of Wisconsin-Madison, Waisman Center; 2005b

Cornwell C, Mustard DB, Van Parys J. Noncognitive skills and the gender disparities in test scores and teacher assessments: Evidence from primary school. Journal of Human Resources. 2013; 48:236–264. DOI: 10.3368/jhr.48.1.236

Connolly F, , Olson LS. Early elementary performance and attendance in Baltimore City schools' pre-kindergarten and kindergarten 2012 Retrieved from Baltimore Education Research Consortium website: http://baltimore-berc.org/early-elementary-performance/

Cook TD, Steiner PM. Case matching and the reduction of selection bias in quasi-experiments: The relative importance of pretest measures of outcome, of unreliable measurement, and of mode of data analysis. Psychological Methods. 2010; 15:56.doi: 10.1037/a0018536 [PubMed: 20230103]

Cheema JR. A review of missing data handling methods in educational research. Review of Educational Research. 2014; 84:487–508. DOI: 10.3102/0034654314532697

Christenson SL, , Sheridan SM. School and families: Creating essential connections for learning New York: Guilford Press; 2001

Christenson SL, , Stout, Pohl A. Check & Connect: A comprehensive student engagement intervention: Implementing with fidelity Minneapolis: University of Minnesota, Institute of Community Integration; 2012

Christenson SL, Thurlow ML. School dropouts: Prevention considerations, interventions, and challenges. Current Directions in Psychological Science. 2004; 13:36–39. Retrieved from. DOI: 10.1111/j.0963-7214.2004.01301010.x

Dube SR, Orpinas P. Understanding excessive school absenteeism as school refusal behavior. Children & Schools. 2009; 31:87–95. DOI: 10.1093/cs/31.2.87

Easton JQ, Engelhard G Jr. A longitudinal record of elementary school absence and its relationship to reading achievement. The Journal of Educational Research. 1982; 75:269–274. DOI: 10.1080/00220671.1982.10885393

Eccles JS. The development of children ages 6 to 14. The Future of Children. 1999:30–44. [PubMed: 10646256]

Ensminger ME, Slusarcick AL. Paths to high school graduation or dropout: A longitudinal study of a first-grade cohort. Sociology of education. 1992; :95–113. DOI: 10.2307/2112677

Entwisle DR, , Alexander KA, , Olson LS. Schools, families, & inequality Boulder, CO: Westview Press; 1997

Epstein JL, Sheldon SB. Present and accounted for: Improving student attendance through family and community involvement. The Journal of Educational Research. 2002; 95(5):308–318. DOI: 10.1080/00220670209596604

Finn JD. Withdrawing from school. Review of Educational Research. 1989; 59:117–42. DOI: 10.3102/00346543059002117

Franklin BJ, Trouard SB. An analysis of dropout predictors within a state high school graduation panel. Schooling. 2014; 5:1–8.

Giovanelli A, Reynolds AJ, Mondi CF, Ou S. Adverse childhood experiences and adult well-being in a low-income, urban cohort. Pediatrics. 2016; 137doi: 10.1542/peds.2015-4016

Gottfried MA. Evaluating the relationship between student attendance and achievement in urban elementary and middle schools an instrumental variables approach. American Educational Research Journal. 2010; 47:434–465. DOI: 10.3102/0002831209350494

Graham JW. Missing data: Analysis and design New York: Springer; 2012

Hayakawa M, Englund MM, Warner-Richter MN, Reynolds AJ. The longitudinal process of early parent involvement on student achievement: A path analysis. NHSA Dialog. 2013; 16 Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5115270/.

Heckman JJ, , Humphries JE, , Mader NS. The GED (No. w16064) 2010 Retrieved from National Bureau of Economic Research http://www.nber.org/papers/w16064

Heckman JJ, LaFontaine PA. Bias-corrected estimates of GED returns. Journal of Labor Economics. 2006; 24:661–700. DOI: 10.1086/504278

Hieronymus A, , Hoover H. Iowa Tests of Basic Skills: Manual for school administrators Chicago: Riverside; 1990

Hieronymus A, , Lindquist E, , Hoover H. Iowa Tests of Basic Skills: Primary battery Chicago: Riverside; 1980

Hightower AD, Work WC, Cowen EL, Lotczewski BS, Spinell AP, Guare JC, Rohrbeck CA. The Teacher–Child Rating Scale: A brief objective measure of elementary children's school problem behaviors and competencies. School Psychology Review. 1986; 15:393–409.

Janosz M, Archambault I, Morizot J, Pagani LS. School engagement trajectories and their differential predictive relations to dropout. Journal of Social Issues. 2008; 64:21–40. DOI: 10.1111/j.1540-4560.2008.00546.x

Karaca-Mandic P, Norton EC, Dowd B. Interaction terms in nonlinear models. Health Services Research. 2012; 47:255–274. DOI: 10.1111/j.1475-6773.2011.01314.x [PubMed: 22091735]

Kena G, , Musu-Gillette L, , Robinson J, , Wang X, , Rathbun A, , Zhang J, , Velez EDV. The condition of education Vol. 2015. Jessup, MD: National Center for Education Statistics; 2015 (NCES 2015-144). Retrieved from: http://files.eric.ed.gov/fulltext/ED556901.pdf

Kearney CA. School absenteeism and school refusal behavior in youth: A contemporary review. Clinical Psychology Review. 2008; 28:451–471. DOI: 10.1016/j.cpr.2007.07.012 [PubMed: 17720288]

Kieffer MJ, , Marinell WH, , Stephenson N. The middle grades student transitions study: Navigating the middle grades and preparing students for high school graduation 2011 Retrieved from NYU Steinhardt Research Alliance for New York City Schools website: http://steinhardt.nyu.edu/research_alliance/publications/navigating_middle_grades_2012

Mac Iver MA, , Mac Iver D. Gradual disengagement: A portrait of the 2008–09 dropouts in the Baltimore City schools 2010 Retrieved from Baltimore Education Research Consortium website: http://baltimore-berc.org/gradual-disengagement/

McCluskey CP, Bynum TS, Patchin JW. Reducing chronic absenteeism: An assessment of an early truancy initiative. Crime & Delinquency. 2004; 50:214–234. DOI: 10.1177/0011128703258942

McDaniel M, Kuehn D. What does a high school diploma get you? Employment, race, and the transition to adulthood. Review of Black Political Economy. 2013; 40:371–399. DOI: 10.1007/s12114-012-9147-1

Mikulecky M. School attendance age limits 2013 Retrieved from Education Commission of the States http://www.ecs.org/clearinghouse/01/07/04/10704.pdf

Moonie S, Sterling DA, Figgs LW, Castro M. The relationship between school absence, academic performance, and asthma status. Journal of School Health. 2008; 78:140–148. DOI: 10.1111/j.1746-1561.2007.00276.x [PubMed: 18307609]

National Assessment of Educational ProgressThe Nation’s Report Card Washington, DC: U. S. Department of Education, National Center for Education Statistics; 2014 Retrieved from https://nces.ed.gov/nationsreportcard/

Neild RC, , Balfanz R. Unfulfilled Promise: The Dimensions and Characteristics of Philadelphia's Dropout Crisis, 2000–2005 Philadelphia: Philadelphia Youth Network; 2006

Niles MD, Reynolds AJ, Nagasawa M. Does early childhood intervention affect the social and emotional development of participants. Early Childhood Research and Practice. 2006; 8:34–53. Retrieved from http://ecrp.uiuc.edu/v8n1/Niles.html.

Office of Disease Prevention and Health Promotion (n.d.). Retrieved from https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health

Ou SR, Mersky JP, Reynolds AJ, Kohler KM. Alterable predictors of educational attainment, income, and crime: Findings from an inner-city cohort. Social Service Review. 2007; 81:85–128.

Ou S, Reynolds AJ. Predictors of educational attainment in the Chicago Longitudinal Study. School Psychology Quarterly. 2008; 23:199–229. DOI: 10.1037/1045-3830.23.2.199

Oreopoulos P. Do dropouts drop out too soon? Wealth, health and happiness from compulsory schooling. Journal of Public Economics. 2007; 91:2213–2229. DOI: 10.1016/j.jpubeco.2007.02.002

Oxley D. Small learning communities: Implementing and deepening practice Portland: Northwest Regional Educational Laboratory; 2007

Ready DD. Socioeconomic disadvantage, school attendance, and early cognitive development the differential effects of school exposure. Sociology of Education. 2010; 83:271–286. DOI: 10.1177/0038040710383520

Reynolds AJ. Educational success in high-risk settings: Contributions of the Chicago Longitudinal Study. Journal of School Psychology [Special Issue Introduction]. 1999; 37:345–354. DOI: 10.1016/S0022-4405(99)00025-4

Reynolds AJ. Success in early intervention: The Chicago child parent centers Lincoln: U of Nebraska Press; 2000

Reynolds AJ, Mavrogenes NA, Bezruczko N, Hagemann M. Cognitive and family-support mediators of preschool effectiveness: A confirmatory analysis. Child Development. 1996; 67:1119–1140. DOI: 10.1111/j.1467-8624.1996.tb01786.x [PubMed: 8706513]

Reynolds AJ, , Hayakawa M, , Candee AJ, , Englund MM. CPC P-3 Program Manual: Child-Parent Center Preschool-3rd Grade Program Minneapolis: University of Minnesota; 2016

Reynolds AJ, Temple JA. Extended early childhood intervention and school achievement: Age thirteen findings from the Chicago Longitudinal Study. Child Development. 1998; 69:231–246. DOI: 10.1111/j.1467-8624.1998.tb06145.x [PubMed: 9499569]

Reynolds AJ, Ou S. Paths of effects from preschool to adult well-being: A confirmatory analysis of the Child-Parent Center Program. Child Development. 2011; 82:555–582. DOI: 10.1111/j.1467-8624.2010.01562.x [PubMed: 21410923]

Reynolds AJ, Richardson BA, Hayakawa M, Lease EM, Warner-Richter MN, Englund MM, Sullivan M. Association of a full-day versus part-day preschool intervention with school readiness, attendance, and parent involvement. JAMA. 2014; 312(20):2126–2134. DOI: 10.1001/jama.2014.15376 [PubMed: 25423219]

RI Data Hub (n.d.). Data Story: High School Chronic Absenteeism & College Persistence: Linking K-12 data to Post-secondary outcomes [Presentation slides] Retrieved from http://ridatahub.org/datastories/high-school-absenteeism-college-persistence/1/

Richardson B, Reynolds AJ, Temple JA, Smerillo NE. School readiness in the Midwest Child-Parent Center Expansion: A propensity score analysis of year 1 impacts. Children and Youth Services Review. 2017; 79:620–630. DOI: 10.1016/j.childyouth.2017.06.042 [PubMed: 28936019]

Robins JM, Rotnitzky A. Semiparametric efficiency in multivariate regression models with missing data. Journal of the American Statistical Association. 1995; 90:122–129.

Romero M, , Lee Y. A national portrait of chronic absenteeism in the early grades 2007 Retrieved from National Center for Children in Poverty website: http://www.nccp.org/publications/pdf/text_771.pdf

Rosenbaum PR, Rubin DB. The central role of the propensity score in observational studies for causal effects. Biometrika. 1983; 70:41–55. DOI: 10.2307/2335942

Rothwell PM. Subgroup analysis in randomised controlled trials: importance, indications, and interpretation. The Lancet. 2005; 365:176–186. DOI: 10.1016/S0140-6736(05)17709-5

Rouse CE. Consequences for the labor market. In: Belfield CR, , Levin HM, editorsThe price we pay: Economic and social consequences of inadequate education Washington, D.C.: Brookings Institution Press; 2007 99124

Rutter M. Fifteen thousand hours: Secondary schools and their effects on children Cambridge, Mass.: Harvard University Press; 1982

Ryan CL, , Bauman K. Educational attainment in the United States: 2015, Population Characteristics (Current Populations Reports No. P20-578) Washington, DC: Bureau of the Census; 2016 Retrieved from https://www.census.gov/content/dam/Census/library/publications/2016/demo/p20-578.pdf

Sälzer C, Trautwein U, Lüdtke O, Stamm M. Predicting adolescent truancy: The importance of distinguishing between different aspects of instructional quality. Learning and Instruction. 2012; 22:311–319. DOI: 10.1016/j.learninstruc.2011.12.001

Sanchez M. Truancy and Chronic Absence in Redwood City Youth Data Archive Issue Brief. John W. Gardner Center for Youth and Their Communities; 2012 Retrieved from https://gardnercenter.stanford.edu/publications/truancy-and-chronic-absence-redwood-city

Schafer JL, Olsen MK. Multiple imputation for missing-data problems: A data analyst's perspective. Multivariate Behavioral Research. 1998; 33:545–571. DOI: 10.1207/s15327906mbr3304_5 [PubMed: 26753828]

Schoeneberger JA. Longitudinal attendance patterns: Developing high school dropouts. The clearing house: a journal of educational strategies, issues and ideas. 2012; 85:7–14. DOI: 10.1080/00098655.2011.603766

StataCorp.Stata Statistical Software: Release 13 College Station, TX: StataCorp LP; 2013

Steiner PM, Cook TD, Shadish WR, Clark MH. The importance of covariate selection in controlling for selection bias in observational studies. Psychological Methods. 2010; 15:250–267. DOI: 10.1037/a0018719 [PubMed: 20822251]

Thomas JM, Lemieux CM, Rhodes JL, Vlosky DA. Early truancy intervention: Results of an evaluation using a regression discontinuity design. Children and Youth Services Review. 2011; 33:1563–1572. DOI: 10.1016/j.childyouth.2011.03.021

Thornberry TP. Toward an interactional theory of delinquency. Criminology. 1987; 25:863–892. DOI: 10.1111/j.1745-9125.1987.tb00823.x

U.S. Department of Education. Chronic absenteeism in the Nation's schools: An unprecedented look at a hidden educational crisis 2016 Retrieved from https://www2.ed.gov/datastory/chronicabsenteeism.html

Valentino S, , Wheeler M. Big Brothers Big Sisters: Report to America: 2013 youth outcomes report Tampa: Big Brothers Big Sisters of America; 2013

Van Eck K, Johnson SR, Bettencourt A, Johnson SL. How school climate relates to chronic absence: A multi-level latent profile analysis. Journal of School Psychology. 2017; 61:89–102. DOI: 10.1016/j.jsp.2016.10.001 [PubMed: 28259246]

Veenstra R, Lindenberg S, Tinga F, Ormel J. Truancy in late elementary and early secondary education: The influence of social bonds and self-control—the TRAILS study. International Journal of Behavioral Development. 2010; 34:302–310. Retrieved from http://journals.sagepub.com/doi/abs/10.1177/0165025409347987.

Wooldridge JM. Inverse probability weighted estimation for general missing data problems. Journal of Econometrics. 2007; 141:1281–1301. DOI: 10.1016/j.jeconom.2007.02.002

**Table 1**

Characteristics of Full, Study, and Attrition Samples

| Characteristic | Full Sample *N* = 1,539 | Study Sample[a] *n* = 1,148 | Attrition Sample *n* = 391 | *p* | *d* |
|---|---|---|---|---|---|
| Any CPC preschool, (%) | 64.3 | 65.1 | 61.9 | .258 | .07 |
| Any follow-on program, (%) | 55.2 | 57.8 | 47.7 | <.001 | .19 |
| African-American, (%) | 92.5 | 92.9 | 93.0 | .848 | <.01 |
| Male, (%) | 49.7 | 49.1 | 51.4 | .435 | −.05 |
| Low birth weight, (%) | 11.8 | 11.4 | 12.8 | .466 | −.04 |
| Adverse Childhood Experience(s)>=2, age 0–5 (%) | 4.9 | 4.1 | 7.3 | .027 | −.15 |
| School in high-poverty area, (%) | 76.0 | 75.4 | 77.5 | .411 | −.05 |
| Participation in AFDC by child age 3, (%) | 62.8 | 63.9 | 59.3 | .104 | .10 |
| Eligible for subsidized meals, (%) | 83.8 | 85.5 | 78.5 | .003 | .19 |
| Mother less than 18 at child's birth, (%) | 16.2 | 16.3 | 15.9 | .841 | .01 |
| Mother did not complete high school by child age 3, (%) | 54.3 | 54.4 | 54.0 | .893 | <.01 |
| Mother not employed by child age 3, (%) | 66.3 | 67.5 | 62.9 | .097 | .10 |
| 4 or more children in home by child age 3, (%) | 16.6 | 17.0 | 15.6 | .526 | .04 |
| Single-parent home by child age 3, (%) | 76.7 | 76.8 | 75.4 | .578 | .03 |
| Cognitive composite at kindergarten entry | 47.4 | 47.3 | 47.6 | .620 | −.03 |

*Note*. CPC = Child Parent Center; AFDC = Aid to Families with Dependent Children.

[a]Those children for whom attendance data was available.

Established alpha is p<.05.

**Table 2**

Description of Key Variables for Study Sample, n = 1,148

| Variable | Mean | SD | Min. | Max. |
|---|---|---|---|---|
| Teacher-reported chronic absence status | .15 | .36 | 0 | 1 |
| Eighth-grade math achievement score | 147.63 | 17.97 | 86 | 225 |
| Eighth-grade reading achievement score | 145.10 | 21.39 | 82 | 212 |
| Four-year graduation by diploma | .48 | .50 | 0 | 1 |
| Graduation by diploma by age 21 | .52 | .50 | 0 | 1 |
| Any high school completion by age 21 | .62 | .49 | 0 | 1 |
| Any CPC preschool | .65 | .48 | 0 | 1 |
| Any CPC follow-on participation | .58 | .49 | 0 | 1 |
| African-American | .93 | .26 | 0 | 1 |
| Male | .49 | .50 | 0 | 1 |
| Low birth weight | .11 | .32 | 0 | 1 |
| More than two Adverse Childhood Experiences, ages 0–5 | .04 | .20 | 0 | 1 |
| School in high-poverty area | .75 | .43 | 0 | 1 |
| Single-parent home by child's age 3 | .77 | .42 | 0 | 1 |
| Mother less than 18 at child's birth | .16 | .37 | 0 | 1 |
| Mother did not complete high school by child's age 3 | .54 | .50 | 0 | 1 |
| Four or more children in home by child's age 3 | .17 | .38 | 0 | 1 |
| Participation in AFDC by child's age 3 | .64 | .48 | 0 | 1 |
| Mother unemployed by child's age 3 | .68 | .47 | 0 | 1 |
| Eligible for subsidized meals | .86 | .35 | 0 | 1 |
| Cognitive composite at kindergarten entry | 47.30 | 8.73 | 2 8 | 83 |
| Third-grade reading score | 96.69 | 16.63 | 48 | 145 |
| Third-grade math score | 100.57 | 13.14 | 60 | 134 |
| Average Social-Emotional Maturity, 1st–3rd grades | 19.20 | 4.67 | 8.01 | 30.31 |
| Ever retained, 1st–3rd grades | .20 | .40 | 0 | 1 |
| Ever special education, 1st–3rd grades | .01 | .10 | 0 | 1 |
| More than two school moves, kindergarten-4th grade | .21 | .41 | 0 | 1 |
| Average teacher-rated parent involvement, 1st–3rd grades | 1.21 | .99 | 0 | 3 |
| Attended high-quality school, 4th grade | .13 | .34 | 0 | 1 |

*Note*. CPC = Child Parent Center; AFDC = Aid to Families with Dependent Children.

**Table 3**

Baseline Characteristics of Study Sample by Chronic Absence Status, n = 1,148

| Characteristic | Not Chronic Absent *n* = 973 | Chronic Absent *n* = 175 | *p* | *d* |
|---|---|---|---|---|
| Any CPC preschool, (%) | 66.0 | 60.0 | .127 | .13 |
| Any follow-on program, (%) | 58.5 | 54.3 | .302 | .08 |
| African-American, (%) | 92.7 | 94.3 | .452 | −.06 |
| Male, (%) | 47.6 | 57.7 | .014 | −.20 |
| Low birth weight, (%) | 10.6 | 16.0 | .068 | −.17 |
| Adverse Childhood Experience(s)>=2, age 0–5 (%) | 4.1 | 4.0 | .946 | .01 |
| School in high-poverty area, (%) | 74.6 | 80.0 | .128 | −.13 |
| Participation in AFDC by child's age 3, (%) | 62.1 | 74.3 | .002 | −.26 |
| Eligible for subsidized meals, (%) | 84.4 | 92.0 | .001 | −.22 |
| Mother less than 18 at child's birth, (%) | 15.6 | 20.0 | .149 | −.12 |
| Mother did not complete high school by child's age 3, (%) | 51.9 | 68.0 | <.001 | −.33 |
| Mother not employed by child's age 3, (%) | 66.3 | 74.3 | .038 | −.17 |
| Four or more children in home by child's age 3, (%) | 17.1 | 16.6 | .895 | .01 |
| Single-parent home by child's age 3, (%) | 76.0 | 81.7 | .076 | −.14 |
| Cognitive composite at kindergarten entry | 47.6 | 45.9 | .021 | .19 |

*Note*. CPC = Child Parent Center; AFDC = Aid to Families with Dependent Children.

Established alpha is p<.05.

**Table 4**

Unadjusted Achievement Means and Rates of High School Attainment Outcomes by Group

| Outcome | Study Sample | Chronic Absent | Not Chronic Absent | Δ | *p* | *d* |
|---|---|---|---|---|---|---|
| Eighth-grade reading achievement | n = 1,113 | n = 165 | n = 948 | | | |
| | 145.4 | 138.1 | 146.7 | −8.6 | <.001 | −.40 |
| Eighth-grade math achievement | n = 1,113 | n = 165 | n = 948 | | | |
| | 147.9 | 140.1 | 149.3 | −9.2 | <.001 | −.52 |
| Four-year graduation by diploma | n = 1,070 | n = 156 | n = 914 | | | |
| | 49.3% | 24.4% | 53.5% | −29.1% | <.001 | −.60 |
| Graduation by diploma by age 21 | n = 1,051 | n = 149 | n = 902 | | | |
| | 51.8% | 28.9% | 55.5% | −26.7% | <.001 | −.54 |
| Any high school completion by age 21 | n = 1,054 | n = 151 | n = 903 | | | |
| | 62.3% | 43.7% | 65.4% | −21.7% | <.001 | −.45 |

*Note*. Established alpha is p<.05.

**Table 5**

Association of Early Middle-Grade Chronic Absence with Eighth-Grade Achievement and High School Attainment, Adjusted Models

| | Eighth-Grade Achievement | | High School Attainment | | |
|---|---|---|---|---|---|
| | **Reading n = 1,113 *β* *(SE)*** | **Math n = 1,113 *β* *(SE)*** | **Four-Year Graduation by diploma n = 1,070 *Marginal Effect* *(SE)*** | **Graduation by diploma by age 21 n = 1,051 *Marginal Effect* *(SE)*** | **Any high school completion by age 21 n = 1,054 *Marginal Effect* *(SE)*** |
| Chronic absence | −.68 (1.17) | −2.93** (.94) | −.18*** (.04) | −.17*** (.03) | −.11** (.04) |
| Effect size (*d*) | −.03 | −.17 | −.37 | −.35 | −.23 |
| Any CPC preschool | 1.21 (1.27) | .07 (.83) | .05 (.03) | .01 (.03) | .07* (.03) |
| Any follow-on program | −1.08 (1.20) | −.43 (1.03) | −.01 (.03) | −.03 (.04) | −.03 (.03) |
| African-American | −5.35*** (1.10) | −4.27* (1.94) | −.05 (.05) | .02 (.04) | −.10** (.03) |
| Male | −1.10 (.97) | −.99 (.63) | −.11*** (.02) | −.10** (.03) | −.11** (.03) |
| Low birth weight | −1.07 (1.42) | −1.04 (1.17) | .03 (.05) | .01 (.04) | −.02 (.03) |
| Participation in AFDC by child's age 3 | .10 (1.14) | −.74 (.78) | −.18** (.05) | −.20*** (.04) | −.15*** (.04) |
| Eligible for subsidized meals | −4.94*** (1.20) | −3.41** (.92) | .01 (.04) | <.01 (.05) | <.01 (.04) |
| School in high-poverty area | .08 (1.15) | −.67 (.96) | .04 (.03) | .09*** (.03) | .06 (.05) |
| Mother less than 18 at child's birth | −.67 1.20 | .52 (.83) | .06 (.04) | .03 (.04) | .03 (.04) |
| Mother did not complete high school by child's age 3 | −1.16 (.94) | −1.19* (.55) | −.12*** (.03) | −.09* (.04) | −.09** (.03) |
| Mother not employed by child's age 3 | −.16 (1.26) | −.69 (1.12) | .05 (.03) | .10** (.03) | .04 (.03) |
| Single-parent home by child's age 3 | −.63 (.99) | −1.20 (.77) | −.07* (.03) | −.06 (.03) | −.02 (.03) |
| 4 or more children in home by child's age 3 | −3.47** (.92) | −.41 (.68) | −.12** (.04) | −.07 (.04) | −.05 (.04) |
| Imputed risk index | .40 (1.65) | .65 (1.28) | −.05 (.05) | .04 (.05) | .03 (.05) |
| Adverse Childhood Experience(s)>=2, 0–5 | 4.07 (2.67) | 1.32 (1.83) | −.14* (.04) | −.15** (.06) | −.10 (.05) |
| Cognitive composite at kindergarten | .23** (.07) | .22** (.04) | −.01** (<.01) | −.01* (<.01) | −.01 (<.01) |
| More than two moves, kindergarten-4th grades | 1.34 (1.14) | 1.46 (1.23) | .01 (.03) | .01 (.03) | .02 (.03) |
| Attended high-quality school, 4th grade | 3.13 (2.01) | 3.68 (2.43) | .09** (.03) | .10** (.03) | .07* (.03) |
| Parent involvement, 1st–3rd grades | −.05 (.48) | −.19 (.39) | .04** (.02) | .03 (.02) | .02 (.02) |

| | Eighth-Grade Achievement | | High School Attainment | | |
|---|---|---|---|---|---|
| | **Reading n = 1,113 *β* *(SE)*** | **Math n = 1,113 *β* *(SE)*** | **Four-Year Graduation by diploma n = 1,070 *Marginal Effect* *(SE)*** | **Graduation by diploma by age 21 n = 1,051 *Marginal Effect* *(SE)*** | **Any high school completion by age 21 n = 1,054 *Marginal Effect* *(SE)*** |
| Ever special ed., 1st–3rd grades | −17.60** (5.43) | −17.89*** (3.30) | .13 (.14) | .09 (.12) | .01 (.12) |
| Socio-emotional maturity index, 1st–3rd grades | .90*** (.16) | .75*** (.10) | .01** (.01) | .01* (.01) | .01* (<.01) |
| Ever retained, kindergarten - 3rd grade | −5.21*** (1.15) | −4.71*** .99 | −.06 (.03) | −.02 (.04) | −.05 (.03) |
| Third-grade reading score | .55*** (.03) | - | - | - | |
| Third-grade math score | - | .65*** (.03) | <.01** (<.01) | .01** (<.01) | <.01** (<.01) |
| Constant | 76.16*** | 68.20*** | - | - | - |
| $R^2$/Pseudo $R^2$ | .57 | .67 | .31 | .27 | .29 |

*Note.* CPC = Child Parent Center; AFDC = Aid to Families with Dependent Children. Standard errors clustered at kindergarten site level. Reported pseudo $R^2$ for probit models are McKelvey and Zavoina's.

* p<.05,

** p<.01,

*** p<.001;

**Table 6**

Inverse-Probability-Weighting Regression-Adjustment Estimates for Association of Chronic Absence in the Early Middle Grades with Eighth-Grade Achievement and High School Attainment

| **Outcome** | ***n*** | ***ATE*** | ***SE*** | ***p*** | ***d*** | **95% *CI*** |
|---|---|---|---|---|---|---|
| Eighth-grade reading achievement | 1,113 | .86 | 1.34 | .523 | .04 | [−1.77, 3.49] |
| Eighth-grade math achievement | 1,113 | −3.07 | .73 | <.001 | −.17 | [−4.50, −1.63] |
| | *n* | *ATE* | *SE* | *p* | *d* | 95% *CI* |
| Four-year graduation by diploma | 1,070 | −.17 | .04 | <.001 | −.36 | [−.25, −.10] |
| Graduation by diploma by age 21 | 1,052 | −.18 | .04 | <.001 | −.37 | [−.26, −.11] |
| Any high school completion by age 21 | 1,050 | −.13 | .04 | .001 | −.27 | [−.20, −.06] |

*Note*. Established alpha is p<.05.

**Table 7**

Associations of Chronic Absence in the Early Middle Grades with Eighth-Grade Achievement and High School Attainment by Subgroups

| Outcome | Gender | | | | Mother's HS Status by Child Age 3 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Male *n* = 543 | | Female *n* = 570 | | High school not complete *n* = 611 | | High school complete *n* = 502 | | Below-average parent involvement *n* = 574 | | Average or above parent involvement *n* = 539 | |
| | Coef. (*SE*) | *d* | Coef. (*SE*) | *d* | Coef. (*SE*) | *d* | Coef. (*SE*) | *d* | Coef. (*SE*) | *d* | Coef. (*SE*) | *d* |
| | 95% *CI* | | 95% *CI* | | 95% *CI* | | 95% *CI* | | 95% *CI* | | 95% *CI* | |
| Eighth-grade reading achievement | −1.75 (1.45) | −.08 | .55 (1.80) | .03 | −.51 (1.52) | −.02 | −.71 (1.75) | −.04 | .67 (1.40) | .03 | −3.83 (2.35) | −.20 |
| | [−4.75, 1.25] | | [−3.17, 4.27] | | [−3.64, 2.62] | | [−4.31, 2.89] | | [−2.25, 3.53] | | [−8.68, 1.01] | |
| Eighth-grade math achievement | −2.85 * (1.06) | −.16 | −3.16 (1.59) | −.18 | −2.44 * (.97) | −.14 | −4.09 * (1.85) | −.23 | −2.63 * (1.11) | −.15 | −2.92 (1.45) | −.18 |
| | [−5.03, −.66] | | [−6.44, .11] | | [−4.44, −.43] | | [−7.91,−.28] | | [−4.91, −.35] | | [−5.92, .08] | |
| | *n* = 512 | | *n* = 540 | | *n* = 584 | | *n* = 486 | | *n* = 549 | | *n* = 521 | |
| Four-year graduation by diploma | −.23 *** (.05) | −.48 | −.12 * (.05) | −.24 | −.14 ** (.05) | −.29 | −.26 *** (.07) | −.53 | −.21 *** (.05) | −.44 | −.13 * (.06) | −.27 |
| | [−.32, −.13] | | [−.22, −.01] | | [−.24, −.04] | | [−.39, −.12] | | [−.30, −.12] | | [−.26, −.01] | |
| | *n* = 511 | | *n* = 540 | | *n* = 579 | | *n* = 472 | | *n* = 538 | | *n* = 513 | |
| Graduation by diploma by age 21 | −.21 *** (.04) | −.42 | −.13 ** (.05) | −.27 | −.16 ** (.04) | −.32 | −.22 ** (.08) | −.45 | −.17 *** (.05) | −.35 | −.18 ** (.06) | −.36 |
| | [−.29, −.13] | | [−.23, −.03] | | [−.24, −.07] | | [−.38, −.06] | | [−.27, −.08] | | [−.30, −.05] | |
| | *n* = 514 | | *n* = 540 | | *n* = 581 | | *n* = 473 | | *n* = 540 | | *n* = 514 | |
| Any high school completion by age 21 | −.14 ** (.04) | −.28 | −.07 (.05) | −.15 | −.11 ** (.05) | −.23 | −.10 (.07) | −.21 | −.15 ** (.05) | −.30 | −.05 (.06) | −.10 |
| | [−.22, −.05] | | [−.17, .03] | | [−.20, −.02] | | [−.24, .05] | | [−.25, −.05] | | [−.16, .07] | |

*Note.*

* p<.05,

** p<.01,

*** p<.001