THE IMPACT OF CHARTER SCHOOL ENROLLMENT ON CHILDREN'S SOCIO-EMOTIONAL OUTCOMES

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ABSTRACT

Now serving nearly 2 million children, charter schools are an oft cited solution to America's achievement gap. While ample research has attempted to disentangle the impacts of charter school enrollment on academic achievement, there has been a dearth of research examining the effect of charter school enrollment on social and emotional outcomes. Using the Early Childhood Longitudinal Study-Kindergarten Cohort and a propensity matching technique, this paper attempts to fill this gap in the literature. Results suggest attending a charter school garners modest benefits as measured by internalizing and externalizing behavior, and perceived mathematics and peer competence. While this benefit is localized in more advantaged children for perceived mathematics competence, the remaining positive impacts are observed only in children who experienced early disadvantage, and are thus most likely to need socio-emotional support. These findings suggest that further exploration of the socio-emotional impacts of charter schools is warranted. Additionally, given the diversity of charter schools, mediators of these effects should be explored.

TABLE OF CONTENTS

CHAPTER ONE

INTRODUCTION

The Impact of Charter School Enrollment on Children's Socio-Emotional Outcomes

Every year millions of American children are victims of America's "education debt," the well-documented disparity in academic achievement between low- versus high- income students (Ladson-Billings, 2006; National Center for Education Statistics (IES), 2010). This disparity is more than a grade level achieved; it represents larger, long-term disparities. Educational achievement correlates with substantial differences in yearly income, as well as myriad other positive outcomes, such as marriage, health, and happiness (BLS, 2011; Martin, 2006; Adams, 2002; Kuh, 1995; Wolfe & Havemann, 2001). However, both the means to pay off this debt and what should be prioritized in doing so are both unresolved, contentious questions.

One much-touted solution to this issue is the expansion of charter schools, or public schools that operate largely outside of government control. These schools are believed to have the flexibility to respond to the increasingly complex demands of students. Charter schools' efficacy has been vigorously examined and debated for the past 15 years (e.g. Bettinger, 1999; Betts & Hill, 2010; Betts & Tang, 2011; Buckley, & Schneider, 2007; Hoxby 2001; 2003; 2004a; 2004b), but solely in terms of academic achievement. Indeed, surprisingly little is known about how charter schools impact students regarding other key outcomes, such as educational attainment and employment. Particularly lacking form existing studies is a focus on social and emotional outcomes, which may play a pivotal role in reducing long-term disparities.

Social and emotional disruptions, including internalizing (e.g. mental health outcomes) and externalizing (e.g. risky sexual and health behaviors, delinquency) behaviors, are tremendously costly both to individuals and the government. For individuals, maladaptive social and emotional functioning may lead to unintended pregnancies, depression, substance abuse, and incarceration. For the federal government, these costs are astronomical. Annually the federal government spends $10.9 billion on teen

childbearing (National Campaign to Prevent Teen & Unplanned Pregnancy, 2011), $275 billion on Medicaid (DHHS, 2012), and $30,000 per inmate (Prisons Bureau, 2011). Importantly, evidence suggests that schools play a role in determining youth socio-emotional outcomes (Battistich & Hom, 1997; Bryk & Driscoll, 1988; Silver, Measelle, Armstrong, & Essex, 2005), particularly for low-income youth, or those most impacted by the achievement gap (Battistich & Hom, 1997; Masten, 2001).

Despite both the importance of these outcomes and the potential role of schools, the impact of education reforms such as charter schools on social and emotional behaviors has not been explored. The present study attempts to address this gap. Using a nationally representative dataset and a matching technique designed to simulate experimental conditions, this study examines whether charter school enrollment from kindergarten through 5th grade impacts middle childhood social and emotional outcomes, net of potential confounding school, family, and child level variables. This paper also examines whether the impact of charter schools varies based on the timing of disadvantage, specifically whether charter schools are more impactful for children currently experiencing poverty or for those who experienced early deprivation.

If the evidence suggests that charter schools do influence youth's social and emotional functioning, policies designed to enhance or dismantle these schools should be re-examined through this lens in addition to academic achievement. Given the individual importance and social cost, promoting schools that assist in the healthy development of social and emotional skills among children could be the most important policy priority for education reform.

CHAPTER TWO

PREVIOUS RESEARCH

Charter Schools Defined

Charter schools are publically funded schools that are granted autonomy in functioning in exchange for increased accountability for academic achievement (Betts & Hill, 2010). These schools are not operated by school districts and are thus free from collective bargaining agreements and bureaucratic regulations. They are granted charters by authorizing agencies, which have the right to approve new schools, oversee and evaluate performance, and close failing charter schools (NACSA, 2011). The first charter was granted in 1992 (Weil, 2000), and the system has quickly grown. Currently, 1.6 million American youth are enrolled in nearly 5,000 charter schools in 39 states (Dynarski et al., 2010). This is largely due to enhanced funding for charter schools at the federal level and the birth of wide scale school choice in No Child Left Behind, the sweeping federal education law of 2001 (NCLB, 2002).

The term "charter school" represents an incredibly diverse category. Although all schools are accountable to state and federal education standards, schools differ in the rigor of their authorizing agencies, their level of funding, their aims and pedagogy, and their populations served. While there is some evidence that charter schools tend to use more traditional pedagogical strategies (Weitzel & Lubienski, 2010), generally speaking, there is no more a prototype for "charter school" than there is for traditional public school. Indeed, their instructional and organizational freedom make charter schools considerably less uniform than their traditional public school counterparts. Despite the ability to operate outside of district requirements however, charter schools do not necessarily guarantee flexible responses to student needs.

Previous Research

Charter school research methodology. Most of the existing charter school scholarship addresses whether charter schools enhance students' academic outcomes, defined as standardized test

scores, relative to their peers in traditional public schools. This scholarship must contend with two methodological issues: nonrandom selection into charter schools such that charter school students are qualitatively different than traditional public school students, and the tremendous variation in the charter school category. To address these issues, researchers have used four types of studies comparing charter schools and traditional public schools at a variety of levels. The first is cross sectional studies where at a given time point charter schools and traditional public schools are matched and compared, controlling for relevant demographic variables. The second study type uses longitudinal data and value added statistics. Value added analyses examine year to year score changes at school or student levels, and compare whether charter school enrollment "adds value" by enhancing test scores more than expected in traditional public schools. Fixed effects and difference-in-difference models comprise the third type of methodology. These techniques use panel data and account for unobservable (i.e., difficult to measure) characteristics of students who opt into charter schools. Finally, experimental studies take advantage of lottery systems as randomization (Scott & Villavivencio, 2009). Each of these strategies engenders tradeoffs, which may account for mixed findings in charter school research. While research exploring whether charter schools tend to select the most advanced or most advantaged students among their applicant pool consistently finds that charter schools instead attract the most disadvantaged and lowest performing students (Sass, 2005; Hoxby & Murarka, 2009; Zimmer et al., 2009), these studies are largely unable to account for unobservable characteristics, such as parental investment (Buckley & Schneider, 2007). While a recent study suggests that difference in parent investment are created *after* charter school enrollment (Cox & Witko, 2008), the issue of selection bias remains endemic to charter school research. Thus, assessments of outcomes associated with charter school attendance should give consideration to the study's ability to establish a control group and to the particular subset of charter schools being examined (i.e., an over-enrolled charter school, city or state level data, etc.).

Charter schools' impacts.

Academic achievement. In addition to differences attributable to methodological strategies, charter school research findings vary based on the grade evaluated and by geographic region.

Nonetheless, some patterns do emerge. Studies using single time point and value added statistics generally find no effects of charter schools or small positive effects. For example Hoxby (2004a; 2004b) conducted nationwide analyses on 99% of all charter school students, using data from state exams, and found an advantage for charter school students, particularly when the comparison school had a similar racial composition (2004a). Similarly, Hoxby reported that charter schools are especially likely to raise the achievement of students who are poor or Hispanic (2004b). However, Hoxby's results revealed some differences across states. Specifically, the charter school advantage was larger in states where charter schools are well established, and charter school effects in some other states were nonsignificant significant or reversed. Conversely, in a study using propensity score matching to create a control group, Berends et al. (2010) examined the importance of instructional conditions rather than charter status on student math achievement. Berends et al. (2010) found no impact of charter schools on math scores, but that teachers' ability and focus on achievement were related to academic gains. In Michigan, Eberts & Hollenbeck (2001) found that charter school students had lower test scores than traditional public school students.

Studies using lottery methods have generally found significant positive results of charter schools on achievement. For example, Hoxby & Rockoff (2004) examined the charter school system in Chicago and found that it raised math and reading scores by six percentage points, and that the advantage for charter school students remained in both treated and intent to treat analyses. In New York City, Hoxby & Murarka (2009) found that the impact of charter schools on treated students was enough to close the white-black achievement gap. Differential effects by population have been found in lottery studies as well. Gleason et al. (2010) conducted a randomized trial across 36 middle schools in 15 states and found that while on average charter schools and traditional public schools showed no differences, charter schools were more effective for lower income and lower achieving students. In large urban areas, charter schools had positive impacts on math achievement, but outside urban centers, these impacts were negative.

Betts & Tang (2011) conducted a meta analysis to summarize this body of evidence. Their results revealed compelling evidence that charter schools underperform traditional public schools in some locations, grades, and subjects. However, at critical ages for overall and long-term student achievement, specifically elementary reading and middle school math and reading, this pattern is reversed, and charter students outperform their traditional public school peers (Betts & Tang, 2011). The meta-analysis also replicated the finding that charter schools tend to be more effective in urban, poor areas, and for low achieving students—the subgroups most underserved by traditional public schools.

Educational attainment. A small subset of research has begun to explore charter school outcomes beyond test scores. In an analysis of Chicago and Florida charter schools, charter school attendance resulted in a 7% increase in the probability of graduating high school and a 10% increase for attending any type of college in Chicago; in Florida, charter school education amounted to a 12-15% increase in the likelihood of graduating high school, and an 8% increase in college attendance (Zimmer et al., 2009; Booker et al., 2008). While these data were not connected to lotteries and thus may be subject to omitted variable bias and selection effects, they represent the first evidence of positive impacts of charter schools on educational attainment on a large scale. Notably, these studies found no effect for test scores, suggesting that in order to have a more accurate picture of the impact of charter schools, more diverse outcomes should be explored.

Socio-emotional outcomes. Despite broadening the focus to include educational attainment, no charter school research to date explores or outcomes that represent the goals of education more broadly (Ladson-Billings, 2006; Hamilton & Stecher, 2010), including socio-emotional outcomes. Socio-emotional health is the foundation for non-cognitive skills, such as self-regulation, emotional regulation, self-esteem, and perseverance (Grusec, 2011; Bornstein & Sawyer, 2008). In children the absence of these skills manifest as internalizing behavior, externalizing behavior, and poor perceived competence and motivation in school (McLoyd, 1998; Hartas 2011). As adults, this competency is strongly predictive of important life outcomes. For example, non-cognitive skills derived from socio-emotional health, such as perseverance, self-regulation, and self-esteem predicts both academic and job market success, including

labor force attachment and wages (Heckman, 2000; Heckman & Rubinstein, 2001; Heckman, Stixrud, & Urzua, 2006). These same skills predict the absence of health risk behaviors such as smoking, early childbearing, and drug use, as well as the absence of criminal behavior (Chiteji, 2010; Heckman, Stixrud, & Urzua, 2006; Carneiro, Crawford, & Goodman, 2007). These outcomes are thus important not only in terms of individual lives, but also for government spending, and make them hallmarks of the long-term goals of much education reform (Ladson-Billings, 2006). As such, the lack of research addressing socio-emotional effects of charter schools is a substantial missing component in the charter school literature.

School Effects on Socio-Emotional Functioning

Education research has robustly documented the ability of schools to affect both youth's socio-emotional functioning and related outcomes. Schools represent a major context of child development as children spend roughly half of their waking hours at school or involved in school-related activities. As such, the emotional climate and social norms of schools can have substantial effects on youth's socio-emotional outcomes (Jennings & DiPrete, 2010). Students who feel part of their school's community and experience supportive relationships with their teachers tend to be protected from negative behavioral trajectories (Hallinger & Murphy, 1986; Bryk & Driscoll, 1988; Battistich, Solomon, Kim, Watson, & Schaps, 1995; Silver et al., 2005; O'Connor, Dearing, & Collins, 2011). Specifically, engagement in the school community is linked to lower drug use and delinquency (Battistich & Hom, 1997; Henry, Knight, & Thornberr, 2012; Hirschfield & Gasper, 2011), as well as adolescent pregnancy (Manlove, 1998). Importantly, research also suggests that favorable effects may be heightened for low-income students who are at greater risk for problem behavior (Silver et al., 2005; O'Connor, Dearing, & Collins, 2011).

Charter schools and socio-emotional functioning. If the relationship between schools and socio-emotional functioning is due to classroom climate and student-teacher relationships, charter schools may be uniquely positioned to enhance socio-emotional functioning. The autonomy of charter schools allows them to more flexibly respond to student needs, potentially facilitating the creation of more supportive and adaptive atmospheres. While the "black box" of charter school processes is currently understudied (Scott & Villavivencio, 2009), some of the most common charter school policies include

extended days and consistent parent communication (Weitzel & Lubienski, 2010), which may facilitate the development of a strong school community. For example, the highly successful Knowledge Is Power Program Schools (Gleason et al., 2010) emphasize extended school time, extracurricular programming, and highly regulated school environments, creating strong bonds among students, and between students and teachers, and schools and parents.

Moderation by socioeconomic status. As discussed above, evidence suggests charter school impacts on academic achievement vary based on the level of disadvantage of the students (Betts & Tang, 2011). This may be because low-income, minority students show cognitive deficits relative to their more advantaged peers as early as kindergarten (Fryer & Levitt, 2004), and are thus most able to benefit from rigorous charter school instruction. This pattern may obtain for socio-emotional outcomes as well. Children experiencing poverty are more likely to experience maladaptive socio-emotional functioning (McLoyd, 1998; Smith, Brooks-Gunn, & Klebanov, 1997; Brooks-Gunn & Duncan, 1997), and this is particularly true for children experiencing early poverty. The instability generated by early deprivation disrupts parenting processes necessary for healthy socio-emotional development, and results in stunted self-regulation (Grusec, 2011; Bornstein & Sawyer, 2008). These deficits tend to result in low peer competence, low self-esteem, and bouts of internalizing and externalizing behavior (McLoyd, 1998). To the extent that a high quality school with a stable, supportive environment is related to improved behavioral trajectories, high quality charter schools may be particularly beneficial for low-income youth who struggle with self-regulation. Specifically, the flexibility to accommodate students and work more closely with parents may facilitate the positive student teacher relationships that have been shown to be particularly beneficial for low-income youth (Masten, 2001; Silver et al., 2005; O'Connor, Dearing, & Collins, 2011).

Present Study

The present study addresses for the first time the relationship between charter school enrollment and socio-emotional functioning using the Early Childhood Longitudinal Study- Kindergarten Cohort (ECLS-K), a nationally representative, longitudinal dataset. To account for potential selection effects,

propensity score matching will be used. Propensity score matching creates a strong counterfactual by eliminating observations from the treatment group that do not have a match in the control group (Gelman & Hill, 2007; Rubin, 1997). This process eliminates individuals who are distinctly different from their traditional public school peers based on a rich set of covariates, and allows for a rigorous exploration of the relationship between charter enrollment and socio-emotional outcomes.

As noted above, charter school impacts on socio-emotional outcomes may vary by child disadvantage. Thus, in addition to exploring the relationship between charter school enrollment and socio-emotional outcomes, the present study also examines whether this relationship is moderated by poverty. Two indicators will be used. Poverty status at kindergarten is used as a proxy for poverty during the first five years of life, a particularly pivotal time for child development (Brooks-Gunn & Duncan, 1997; Duncan, Yeung, Brooks-Gunn, & Smith, 1998; Heckman, 2006). This interaction will test whether charter schools can help students overcome the substantial negative effects of early deprivation, in particular. Second, moderation by concurrent poverty status will be examined to test whether charter schools are more or less effective for students currently struggling with disadvantage. Using propensity score models and multiple indicators of poverty allows me to both address selection bias in a rigorous way, and explore patterns of charter school impacts on students most in need of socio-emotional intervention.

CHAPTER THREE

METHOD

Data:

Data are drawn from the Early Childhood Longitudinal Study: Kindergarten Cohort (ECLS-K), a nationally representative sample of 21,260 kindergarteners in about 800 public and 200 private schools in 1998-1999. The ECLS-K tracked children from kindergarten through 8th grade, focusing on school experiences, including their school entry and transition to middle school. Families and Schools were interviewed first in the fall and spring of the 1998-99 kindergarten year. They were interviewed again in the fall and spring of 1st grade, spring of 3rd, spring of 5th, and spring of 8th grades. Students were interviewed in 3rd, 5th, and 8th grades. The full sample was interviewed in fall and spring of kindergarten; in 1st grade fall a 30% subsample was interviewed; in 1st grade spring the full sample plus additional respondents were interviewed; and the full sample was interviewed for the rest of the waves of data collection (NCES, 2009).

Typical of longitudinal data sets, response rates in the ECLS-K decrease over time. In kindergarten, the overall response rate at the child level was 65%; in 1st, 60%; in 3rd 51%; in 5th 48%; and in 8th 37%, n= 9,358 (NCES, 2009).

The ECLS-K assesses school, family, community, and individual factors, making it ideal for comprehensive, longitudinal analyses. There are rich outcome variables, in addition to demographic and family information critical to unbiased estimates.

Additionally, the ECLS-K provides a unique opportunity to examine charter schools and socio emotional outcomes. The first charter was granted in 1990, meaning that many other longitudinal datasets with socioemotional measures (e.g. Children of the NLSY, Add Health) do not include measures of charter school enrollment. As the ECLS-K began data collection in 1998, public charter school enrollment is measured at each wave, making this dataset uniquely able to capture the impact of charter enrollment

on socioemotional outcomes. Importantly, through 5th grade, the item asked whether the school was a "school of choice" and thus may also include open enrollment schools. More on this limitation will be presented in the discussion.

Variables:

Outcome Variables: Behavior Problems & Perceived Competencies

During the spring of 5th grade students completed the Self Description Questionnaire (SDQ) to assess student beliefs in their own skills and behaviors. Child behavior problems are broken into externalizing behavior (items such as "I often argue with other kids;" "I get in trouble for talking and disturbing other kids") and internalizing behaviors (items such as "I often feel lonely;" "I feel ashamed when I make mistakes at school"). ECLS-K reports high internal validity for these scales, with Cronbach's alphas ranging from 0.75 to 0.79 (NCES, 2009). Competencies include mathematics and peer relationships. The Perceived Interest/Competence in Mathematics subscale includes items such as "work in math is easy for me," "I am interested in math," and "I can do very difficult problems in math," which are scored on a 1-4 scale ranging from "not at all true" to "very true." Final scores are computed by taking the mean of the items, resulting in a math competency scale ranging from 1-4. The Perceived Interest/Competence in Peer Relationships subscale is structured and scored in the same way, and included items such as "I have lots of friends," "I make friends easy," and "I get along with kids easily."

Charter School Enrollment

At each year of data collection, school administrators were asked to report on the type of school the child was enrolled in, including public charter ("charter school or open enrollment"). Parents were also asked to report whether their child had switched schools in between interviews. Administrator report is used to code whether students were enrolled in a charter school during the years of ELCS-K data collection and the off years (2nd and 4th grades) are coded based on parent report of school switching.

Charter school treatment is measured with a time of treatment variable that indicates how many years the child had been enrolled in a charter school through 5th grade, ranging from 0-6.

Early and Concurrent Disadvantage

Early disadvantage is measured using parent report of income at kindergarten. If parent's reported income was less than the federal poverty line for their reported family size, they are coded as poor at kindergarten, an indicator for early disadvantage, and all others are coded as non-poor at kindergarten. Concurrent disadvantaged is measured through parent report of income at 5th grade, however this was given as a categorical measure in the original parent questionnaire. Thus, all individuals with reported incomes of less than $20,000 are coded as poor at 5th grade; all others are coded as non-poor. This cut-off was used because the federal poverty threshold for a family of 4 was $19,157 (US Census Bureau, 2004).

Covariates

Covariates are measured at the level of child, family, and school. Time invariant covariates are assessed at kindergarten. Time varying characteristics are drawn from the nearest time point before the decision to enroll in a charter was made. For example, if a student never enrolled in a charter, covariates re drawn from kindergarten; if a child enrolled in a charter in second or third grade, covariates are drawn from first grade.

Child level variables include gender (dummy variable indicating male), race (set of dummy variables for Black, Hispanic, Asian, and other, with white as omitted), native language (1 if English, 0 otherwise), previous math and literature achievement, and whether the child has an IEP on record at each grade. Child, teacher, and parent report of previous internalizing and externalizing behavior are also included.

Family level variables include whether the family received AFDC/TANF in the last 12 months, whether the child is eligible for free or reduced-price lunch, maternal education (a series of dummies indicating less than high school, high school or GED, and less than college degree, with a college degree or more as omitted), maternal employment (not employed, part time, full time, with not looking as the omitted), enrollment in center based care before kindergarten, Head Start participation, whether the mother's first birth was as a teenager, whether the mother was married to the biological father at birth, number of siblings in the house, mother's citizenship (1 if United States, 0 otherwise), a three-level categorical income variable, how often the mother read to the child before kindergarten (never, once or

twice a week, or 3 to 6 times a week, with everyday as omitted), and expectations of how far the child will go in school (less than high school, high school, some college, with college or more as omitted).

School level variables include a 5-level categorical measure of the percent of students with limited English proficiency in the school, percent of students eligible for free or reduced-price lunch, a three-level measure of urbanicity, and a dichotomous indicator of whether the school received Title I funds.

Analytic Sample:

The analytic sample includes all individuals with full data on the key independent and dependent variables who have a match in the treatment/control group (all measures excluding covariates, N=10,203). To address missing data for independent (but not dependent) variables, data are multiply imputed (vonHippel, 2007) using the ICE command in Stata 12.0, which is based on a regression switching protocol using chained equations (Royston, 2007). Following conventional guidelines (McCartney, Burchinal, & Bub, 2006; Graham, 2009), ten imputed datasets are generated. Propensity match models and subsequent multiple regression analyses are run within each imputed datasets and coefficients and standard errors were combined.

Analysis Plan:

These analyses take advantage of propensity score matching to help ensure unbiased estimates of the impact of charter school enrollment. Propensity score matching is a technique for ensuring that the outcomes among treated cases (in this instance, students enrolled in charter schools) are compared to those cases that are similar to them on key characteristics (Gelman & Hill, 2007; Rubin, 1997). Unweighted logistic regression models using a full set of covariates are used to predict a single propensity score that indicates the likelihood of any given student to enroll in a charter school. Using the propensity scores, matches are created between treated and untreated cases, and a weighted average of the differences can be computed. Propensity scoring is considered to be most effective when a comprehensive set of covariates are included, when the treatment and control groups are drawn from similar geographic areas, and with outcome variables that are measured identically across groups (Heckman, Ichimura,

Smith, & Todd, 1996; Heckman, Ichimura, & Todd, 1997). The ECLS-K allows me to meet each of these conditions.

As noted above, data in the present study are multiply imputed. Thus, propensity scores are first calculated separately within each imputed dataset (Berger, Bruch, Johnson, James, & Rubin, 2009), and then used in three separate ways: to restrict the analytic sample to matched pairs; to restrict the analytic sample to a region of common support, or of similar observations; and as a variable in the analysis model. First, the propensity scores are matched one to one with their nearest neighbor (with no replacement), resulting in a sample of 1,876 charter school enrollees and their nearest matches, total *N*=3,752. Second, a region of common support is imposed by dropping the 10% of treatment observations at which the propensity score density of the control observations is lowest. This discards the 208 charter school enrollees most unlike their traditional public school peers, resulting in a total *N*=9,995. Finally, the propensity scores are retained and used as a covariate (*N*=10,203).

Restricting to the propensity score match sample ensures that analyses are run on groups that are on average equivalent across all covariates included in the propensity model. However, to test the impact of time spent in a charter school more conservatively, covariates are also included in each of the substantive OLS regressions. To test for the main effect of time spent in a charter school and for evidence of moderation by early and concurrent disadvantage, four models are used for each of the 4 socio-emotional outcomes. In model 1, the impact of charter is tested while controlling for early disadvantage. In model 2, an interaction between number of years spent in a charter and early disadvantage is added to test whether the impact of charter school enrollment is moderated by early childhood poverty. In models 3 and 4, these analyses are replicated using the indicator for contemporaneous disadvantage. All estimates are pooled across the imputed data sets and weighted using ECLS-K replicate weights J2_6FC1-J2_6FC90. These models are then replicated across the less restricted sample (*N*=9,995) and on the full sample, but including the propensity score as a covariate (*N*=10,203). While the most conservative test is the preferred model, using the three samples allows me to test whether the results are sensitive to the specification of the propensity score model or to the inclusion/exclusion of cases.

CHAPTER FOUR

RESULTS

Descriptive Statistics

Table 1 gives descriptive statistics comparing traditional public and charter school students. Twenty-three percent of the sample reported enrolling in a charter school, of these the plurailty (46%) were enrolled in charters for two years. On average charter and traditional public school students reported equal levels of internalizing and externalizing behavior, and perceived peer and mathematics competence at 5th grade. Table 1 also suggests that while *on average* charter school students are more disadvantaged than their traditional public school peers, the most disadvantaged students are *less* likely to enter charter schools, providing some evidence for positive selection into charter schools. The weighted probit models displayed in Table 2 corroborate this curvilinear pattern. For example, while charter school students were more likely to have received free and reduced price lunch, they were also less likely to have been on welfare. Charter enrollees were more likely to be Hispanic, but less likely to be Black. They had higher literary scores, and baseline levels of internalizing behavior, but lower mathematics achievement and baseline levels of externalizing behavior. They were less likely to have born in wedlock, and more likely to be of moderate as opposed to high socioeconomic status and income. Finally, they were less likely to attend a school with a small share of second-language learners. Taken together, this evidence paints a complex picture of selection, and suggests that a matching procedure should be used to generate similar samples of charter and traditional public school students, but that a region of common support should be readily identified.

The Matching Procedure

Table 3 displays the results of the propensity matching procedure. As noted above, propensity models were run separately by imputation, thus this table represents one of the 10 imputations, but patterns were similar across all imputations. The success of the matching procedures used to create

comparable groups can be judged by examining the balance of key covariates between the two groups—whether there are statistically significant differences in their means. While prior to matching, 32 of the covariates differed by charter enrollment at the 0.10 level, after matching just three differed by charter enrollment status. This suggests that the match procedure successfully generated balanced treatment and control groups. The next question is whether the covariates are predictive of charter enrollment post-matching. While the propensity model R^2 was nearly 0.20 prior to matching, after matching, the model pseudo R^2 was 0.006. This suggests that the match successfully reduced differences between the treatment and control group such that remaining differences are not greater than would have been observed by chance.

As noted above, the matching procedure discarded the 208 charter enrollees who were least like their traditional public school peers. To understand how the match procedure culls the sample to create matched groups, it is important to explore the characteristics of those enrollees without traditional public school matches. Table 4 gives descriptive statistics on child, family, and school characteristics for observations on and off common support based on the 10% trim. This table suggests that, on average, the students who did not meet the common support criteria were substantially more disadvantaged than those in the matched sample. Specifically, these 208 students had lower-income, more behavior problems, were more likely to have an IEP, and be a second language learner than those in the region of common support. Moreover, these students were more likely to have mothers with less than a high school education, have been born to a teen mother, and attend a school that receives Title 1 funding.

Socio-Emotional Outcomes

Table 5 displays the results of the weighted, imputed regression models controlling for all covariates included in the propensity model. This table gives results for the most closely matched sample (*N*= 3,752) and reported coefficients are standardized such that each coefficient represents the effect of one year of enrollment in a charter school in standard deviation units.

Perceived Mathematics Competence

Models 1 and 3, which test for the main effect of charter schools on perceived mathematics competence reveal no statistically significant association between years in a charter school and perceived math competency. However, Models 2 and 4, which test for moderation by poverty status, reveal positive, statistically significant associations between charter enrollment and perceived mathematics competence, β= 0.05, $p<0.10$. This pattern suggests that while charter schools enhance perceived mathematics competence, this effect is localized to less disadvantaged children or those who experienced neither early nor concurrent poverty. This pattern is mimicked, though slightly attenuated, in the models using the common support sample (N= 9,995) and in those using the full sample but with the propensity score as a covariate (N= 10,203). While the estimated beta represents a modest effect of one year of charter enrollment, extrapolating to the full potential time spent in charter school for the sample, 5 years in a charter school would generate a quarter of a standard deviation increase in perceived mathematics competence. To aid in this interpretation, Figure 1 demonstrates the predicted mean perceived mathematics competence in standard deviation units for those never enrolled in charter schools and those in charters for 4 years, by early deprivation status, based on Model 2.

Perceived Peer Competence

Model 1 and 3 again demonstrate no main effect of charter schools on perceived peer competence. However, Model 2 reveals that for those who experienced early deprivation, charter schools increase perceived peer competence, and that this impact is roughly one-tenth of a standard deviation per year in charter, β= 0.10, $p<0.05$. Interestingly, this moderating effect is not seen for those experiencing concurrent poverty. Additionally, this pattern of results holds across both alternative samples. Figure 2 demonstrates the predicted standardized levels of peer competence by poverty status at kindergarten and years in charter, based on Model 2. This figure demonstrate that for children who experienced early deprivation, spending 4 years in a charter school is associated with a 0.3 standard deviation increase in perceived peer competence, and movement from below average to above average competency.

Internalizing Behavior

Across all 4 models examining internalizing behavior, point estimates and standard errors were very similar, with and without moderation by early and concurrent poverty status. However, this estimate only achieved statistical significance in Model 4, which examined moderation by concurrent poverty status (β= 0.03, $p<0.10$). However in the models using the common support restriction and the propensity score as a covariate these estimates do reach statistical significance across all 4 models (not shown). This suggests that these models may have lacked the power to detect associations. Figure 3 demonstrates the relationship between time in charter schools and poverty status at kindergarten for internalizing behavior, using estimates from Model 2. The parallel downward sloping lines suggest a slight negative association between charter school enrollment and internalizing behavior that does not differ by poverty status.

Externalizing Behavior

The impact of charter schools on externalizing behavior is similar to its effects on perceived peer competence. The only association observed in the most conservative match models presented in Table 5 is in Model 2, which demonstrates a statistically significant negative relationship between years in charter schools and externalizing behavior only for youth who experienced early deprivation (β= -0.08, $p<0.10$). This association is robust to the use of the common support sample, and the use of the propensity score as a covariate. Figure 4 demonstrates the relationship between time in charter schools and poverty status at kindergarten for externalizing behavior, using estimates from Model 2. This figure demonstrates the substantial effect of charter schools on externalizing behavior, such that after 4 years in a charter school youth who experienced early deprivation are demonstrating levels of externalizing behavior similar to their non-poor peers. In contrast, the externalizing behavior of those who did not enroll in charter schools, was four-tenths of a standard deviation above average.

CHAPTER FIVE

DISCUSSION

The present study explored whether time spent in charter schools impacted four different socio-emotional outcomes, and whether this impact is moderated by early disadvantage, concurrent disadvantage, or both. This research addresses the lack of non-cognitive outcomes in the current charter school literature, and is the first to explore the role of charter enrollment in shaping internalizing behavior, externalizing behavior, and perceived peer and mathematics competence. Moreover, by examining moderation by poverty status, this paper explores whether charter schools can play a role in closing the achievement gap through enhancing the socio-emotional functioning of students typically underserved by public schools.

Results indicate that charter schools can have beneficial effects on socio-emotional functioning in early child, but that the nature of this impact varies in size and by outcome analyzed. Moreover, while generally charter schools seem to be more beneficial for the most disadvantaged students, or those who experienced poverty during the first 5 years of life, this is not the case for all outcomes. For youth who experienced early disadvantage, charter school enrollment seems to have most impacts on perceived peer competence and externalizing behavior. However, charter schools appear to enhance the perceived mathematics competence only of those students who did not experience poverty. It is less clear whether charter schools impact internalizing behavior, though preliminary evidence suggests there may be small decreases in internalizing behavior for all charter school students.

The variation in impact by socio-emotional outcome may be due to the qualitatively different experience of youth who experience early poverty. As noted above, early poverty is tremendously disruptive to healthy development (Smith, Brooks-Gunn, & Klebanov, 1997; Brooks-Gunn & Duncan, 1997; Duncan, Yeung, Brooks-Gunn, & Smith, 1998; McLoyd, 1998; Heckman, 2006). During the first 5 years of life, children are developing critical self-regulation skills, based primarily on inputs from their

parents (Grusec, 2011; Bornstein & Sawyer, 2008). For children who live in poverty during the first 5 years, this crucial development is often interrupted by less responsive parenting due to parental stress, and results in poorer emotional understanding, emotional regulation, and peer competence (Hartas, 2011; McLoyd, 1998; Izard et al., 2001; Yates, Obradovic, & Egeland, 2010). This developmental disruption is particularly likely to show up in the domains of externalizing behavior and peer interactions, where the ability of a child to modulate anger and frustration is paramount. If charter schools are able to be more responsive to student needs, and thus able to help teach poor self-regulators critical skills, this effect of this support would only be seen among students who lack these basic capabilities.

Conversely, perceived mathematics competence in the ECLS-K is primarily a measure of confidence in your abilities and willingness to persist. For poor youth, cognitive disadvantage is substantial. Indeed, the impact of poverty on cognitive ability is more severe than for behavioral outcomes (Smith, Brooks-Gunn, & Klebanov, 1997; Brooks-Gunn & Duncan, 1997). As early as first grade, poor youth are two-tenths of a standard deviation behind their more affluent peers, and this gap increases as children proceed through school (Fryer & Levitt, 2004). It may be that a few years in a charter school is not enough for these students to overcome these disadvantages. These students may simply be assessing their skill level accurately. Thus, for those students with the cognitive ability to take advantage of responsive, rigorous instruction, mathematics competence grows quickly; for those without foundational capabilities, charter schools may be less effective on average. If students are comparing themselves to more capable peers, perceived competence will be lower. This diverges somewhat from published findings using test scores that suggest that charters are more beneficial academically for more disadvantaged students (Betts & Tang, 2011), however often these improvements are located in "no excuses" charter schools (Gleason et al., 2010; Curto, Fryer, & Howard; 2010), and thus exploration of how this outcome varies by school characteristics is warranted.

It is important to note that the propensity match dropped the 208 most disadvantaged charter school students from the analytic sample, because these students were not matchable. While these students were included in the models that include the propensity score as a covariate, which mirrored the

findings of the subsample, these findings should engender a more rigorous analysis of *who* enrolls in a charter school. While the literature on charter schools is concerned about "creaming" or positive selection, it also appears that a non-negligible group of highly disadvantaged students are taking advantage of charter school systems.

Limitations

As noted above, the most significant limitation is that the charter school indicator may have included youth who exercised school choice through open enrollment policies. Research on open enrollment policies suggest that benefits of open enrollment are due to positive selection bias; students who opt out of their assigned school are those who were likely to do well regardless (Cullen, Jacob, & Levitt, 2000; 2006). Thus, if the matching procedure was effective, and unobserved differences between groups were minimized, the inclusion of open enrollment public schools would serve to make the test more conservative. If the impact of charter schools on socio-emotional outcomes is based on teachers, staff, and administration being able to more flexibly respond to students, then including traditional public schools in the treatment group will attenuate any association between charter schools and socio-emotional outcomes.

Second, while propensity matching helps reduce bias in the estimates, it is not equivalent to a randomized design. Nonetheless, there are several reasons to be confident that the match reduced the potential bias of the estimates. The match procedure was effective in generating a sample that was equal on all observable covariates, and the ECLS-K's rich data allowed these matches to account for several important characteristics, including household stability and parental expectations and investment as measured through expected school completion, early reading and enrollment in center based care. Moreover, the match procedure strengthened associations between charter schools and socio-emotional outcomes, rather than reducing them. Specifically, OLS regressions that did not account for selection did not reveal statistically significant associations between internalizing behavior or mathematics competence and charter schools, and associations between externalizing behavior and peer competence were smaller in magnitude.

Implications and Conclusions

This study is the first to my knowledge to demonstrate a link between charter schools and socio-emotional outcomes in middle childhood in a nationally representative dataset, and further study of this link is warranted, both because socio-emotional well being is an important school outcome, and for potential cost savings for federal programs. However, understanding the mechanisms behind these associations is paramount. Charter schools represent a diverse body of institutions, and though estimated effect sizes were small, it may be that these impacts are localized in specific schools, and thereby much larger than what might be present on average. Unevenness in the advantages across different types of charter schools has been observed in studies of academic outcomes and this may obtain for socio-emotional development as well (Betts & Tang, 2011; Gleason et al., 2010). Thus it is important that future research explore what school characteristics may mediate this relationship.

Identifying which charter schools engender these socio-emotional benefits and through what avenues has important policy implications. Given the tremendous amount of resources dedicated to the sequelae of maladaptive socio-emotional development—including delinquency, teen childbearing, and dropout—understanding how charter schools promote healthy development is pivotal in making decisions about school reform and the charter school system. Indeed, if policies within some charter schools can dramatically improve socio-emotional development, promoting these policies may be the most important reason to continue to support charter schools.

TABLES AND FIGURES

Table 1.

Descriptive statistics for child, family, and school characteristics by charter school enrollment

		In Charters	Not in Charters
Ever in Charter		22.93	
Time in Charter (years)	0		100
	1	20.59	
	2	45.63	
	3	19.63	
	4	8.35	
	5	5.81	
5th Gr Internalizing		2.04(.03)	2.08(.01)
5th Gr Externalizing		1.90(.03)	1.89(.02)
5th Gr Perceived Math Comp.		2.96(.03)	2.90(.02)
5th Gr Perceived Peer Comp.		2.94(.03)	2.98(.01)
Poor at Kindergarten		26.14	22.83
Poor at 5		17.5	16.31
Male		53.23	51.11
White		53.53	58.96
Black		14.27	16.58
Hispanic		23.96	17.44
Asian		2.82	2.78
Other Race		5.41	4.22
Second Language Learner		23.13	20.03
IEP		9.23	8.08
Math Achievement		2.97(.06)	2.83(.03)
English Achievement		2.99(.06)	2.62(.025)
Ever in Head Start		17.75	14.97
Ever in Center Based Care		20.21	16.84
Number of Siblings		1.57(.05)	1.41(.02)
Welfare		6.11	12.69
Low Income (< $25,000)		29.84	31.61
Medium Income(< $75,000)		50.85	46.17
High Income		19.31	22.22
Receives Free/Reduced Lunch		40.72	31.08

Teen Mom	31.1	27.96
Marital Birth	60.96	69.78
Mom Less than HS	12.91	15.22
Mom HS	29.85	28.89
Mom Some College	34.99	32.02
Mom College or More	22.25	23.86
Mom Unemployed	3.52	3.54
Mom Part Time	21.82	21.05
Mom Full Time	50.29	45.09
Mom Not Looking for Work	24.37	30.32
Parents Expect Less than HS	0.16	0.42
Parents Expect HS Grad	9.65	9.62
Parents Expect Some College	18.05	14.13
Parents Expect Finish College	72.13	75.84
Parents Don't Read to Child	1.1	1.04
Parents Read 1-2x a Week	17.21	17.92
Parents Read 3-6x a week	37.39	35.87
Parents Read Daily	44.3	45.17
Large or Mid Size City	43.5	35.87
Large or Mid Size Suburb	34.44	44.22
Rural	22.06	19.91
Percent Free/Red. Lunch in Sch	37.56	37.34
Sch Receives Title I	67.44	59.62
Sch 0-20% Language Learners	43.77	58.35
Sch 20-40% Language Learners	23.8	21.11
Sch 40-60% Language Learners	6.35	5.88
Sch 60-80% Language Learners	12.94	7.93
Sch 80-100% Language Learners	13.14	6.73

Note: Data are drawn form ECLS-K Public Use Data File. *N*=10,203. All means were calculated using jackknife replicate weights J2_6FC1-90.

Table 2.

Weighted probit model predicting whether a student ever enters a charter school

	Coef.	Std. Err.	
Male	0.18	0.06	***
White (omitted)			
Black	-0.23	0.11	**
Hispanic	0.24	0.11	**
Asian	0.16	0.14	
Other Race	0.09	0.19	
Second Language Learner	-0.11	0.10	
IEP	0.05	0.13	
Math Achievement	-0.29	0.07	***
English Achievement	0.63	0.08	***
Internalizing (Child Report)	0.47	0.07	***
Externalizing (Child Report)	-0.25	0.06	***
Internalizing (Tchr Report)	0.20	0.07	***
Externalizing (Tchr Report)	-0.01	0.06	
Impulsive (Parent Report)	-0.14	0.05	***
Sociability (Parent Report)	0.04	0.06	
Ever in Head Start	0.12	0.10	
Ever in Center Based Care	0.12	0.11	
Number of Siblings	0.11	0.03	***
Welfare	-0.67	0.11	***
Poor at K	0.10	0.11	
Low Income (< $25,000)	0.04	0.16	
Medium Income (< $75,000)	0.19	0.10	*
High Income (omitted)			
Receives Free/Reduced Lunch	0.35	0.10	***
Low SES	-0.06	0.15	
Medium SES	0.19	0.10	*
High SES (omitted)			
Teen Mom	-0.03	0.08	
Marital Birth	-0.28	0.09	***
Mom Less than HS	-0.16	0.19	
Mom HS	-0.05	0.15	
Mom Some College	-0.05	0.12	
Mom College or More (omitted)			
Mom Unemployed	0.16	0.18	
Mom Part Time	0.08	0.09	
Mom Full Time	0.16	0.07	**

Mom Not Looking for Work (omitted)			
Parents Expect Less than HS	-0.29	0.39	
Parents Expect HS Grad	0.10	0.14	
Parents Expect Some College	0.13	0.11	
Parents Expect Finish College (omitted)			
Parents Don't Read to Child	0.04	0.22	
Parents Read 1-2x a Week	-0.09	0.09	
Parents Read 3-6x a week	-0.02	0.08	
Parents Read Daily (omitted)			
Large or Mid Size City	0.01	0.14	
Large or Mid Size Suburb	-0.02	0.14	
Rural (omitted)			
Percent Free/Rd Lunch in Sch	-0.00	0.00	
Sch Receives Title I	0.15	0.15	
Sch 0-20% Language Leaners	-0.41	0.18	*
Sch 20-40% Language Leaners	-0.19	0.17	
Sch 40-60% Language Leaners	-0.12	0.24	
Sch 60-80% Language Leaners	-0.01	0.18	
Sch 80-100% Language Leaners (omitted)			

Note: Data are drawn from the ECLS-K Public Use Data. *N*=10,203. All models were weighted using jackknife replicate weights J2_6FC1-90.
*p<0.10, **p<0.05, ***p<0.01

Table 3.

Balance statistics for propensity score matching procedure

	Treated Mean	Control Mean	Percent Bias	
Male	0.51	0.52	-2.10	
Black	0.11	0.13	-4.00	
Hispanic	0.20	0.21	-2.60	
Asian	0.08	0.09	-4.00	
Other Race	0.07	0.08	-4.20	
Second Language Learner	0.28	0.30	-4.60	
IEP	0.08	0.08	1.40	
Math Achievement	2.89	2.84	5.00	
English Achievement	2.88	2.82	6.70	**
Internalizing (Child Report)	1.70	1.68	3.90	
Externalizing (Child Report)	2.65	2.69	-5.80	*
Internalizing (Tchr Report)	1.59	1.60	-1.60	
Externalizing (Tchr Report)	1.65	1.65	1.20	
Impulsive (Parent Report)	1.97	1.97	0.50	
Sociability (Parent Report)	3.29	3.27	2.40	
Ever in Head Start	0.16	0.16	0.30	
Ever in Center Based Care	0.17	0.16	0.40	
Number of Siblings	1.56	1.55	0.70	
Welfare	0.07	0.07	-1.80	
Poor at K	0.25	0.26	-2.40	
Low Income (< $25,000)	0.32	0.32	-1.20	
Medium Income (< $75,000)	0.52	0.52	-0.60	
Receives Free/Reduced Lunch	0.37	0.38	-2.90	
Low SES	0.40	0.40	-0.30	
Medium SES	0.22	0.21	2.40	
Teen Mom	0.27	0.27	0.00	
Marital Birth	0.70	0.70	-0.70	
Mom Less than HS	0.14	0.15	-5.00	
Mom HS	0.31	0.30	2.50	
Mom Some College	0.35	0.35	0.30	
Mom Unemployed	0.04	0.04	-0.60	
Mom Part Time	0.22	0.20	4.90	
Mom Full Time	0.48	0.49	-0.90	
Parents Expect Less than HS	0.00	0.00	1.00	
Parents Expect HS Grad	0.09	0.10	-1.70	
Parents Expect Some College	0.16	0.15	3.40	
Parents Don't Read to Child	0.02	0.02	-0.90	
Parents Read 1-2x a Week	0.17	0.17	1.00	
Parents Read 3-6x a week	0.36	0.36	-0.70	

Large or Mid Size City	0.40	0.42	-6.00	*
Large or Mid Size Suburb	0.33	0.32	3.90	
Percent Free/Rd Lunch in Sch	36.05	35.85	0.70	
Sch Receives Title I	0.66	0.66	0.80	
Sch 0-20% Language Learners	0.49	0.47	4.10	
Sch 20-40% Language Learners	0.16	0.17	-1.10	
Sch 40-60% Language Learners	0.07	0.07	-2.00	
Sch 60-80% Language Learners	0.14	0.15	-3.10	

Note: Data are drawn from the ECLS-K Public Use Data. *p<0.10, **p<0.05

Table 4.

Descriptive statistics for child, family, and school characteristics by common support

		Off Support	On Support
Ever in Charter		100	18.80
Time in Charter (years)	1	3.85	22.40
	2	86.54	41.10
	3	5.77	21.16
	4	3.85	8.85
	5	0.00	6.45
5th Gr Internalizing		2.20(.67)	2.04(.62)
5th Gr Externalizing		1.94(.65)	1.82(.65)
5th Gr Perceived Math Comp.		2.90(.78)	2.92(.77)
5th Gr Perceived Peer Comp.		2.88(.65)	3.00(.60)
Poor at Kindergarten		38.94	20.43
Poor at 5		30.30	15.90
Male		49.04	50.30
White		32.21	58.50
Black		14.42	11.22
Hispanic		25.00	18.12
Asian		16.83	6.78
Other Race		11.54	5.41
Second Language Learner		39.42	26.60
IEP		13.94	6.01
Math Achievement		3.20(.87)	2.91(.92)
English Achievement		3.62(.91)	2.71(.81)
Ever in Head Start		30.29	13.05
Ever in Center Based Care		10.58	15.89
Number of Siblings		2.11(1.66)	1.47(1.15)
Welfare		2.40	8.39
Low Income (< $25,000)		36.54	27.75
Medium Income (< $75,000)		57.69	50.29
High Income		5.80	21.90
Receives Free/Reduced Lunch		67.31	28.72
Teen Mom		41.83	23.15
Marital Birth		57.69	74.14
Mom Less than HS		18.27	13.21

Mom HS	28.37	28.77
Mom Some College	46.15	31.93
Mom College or More	7.10	26.10
Mom Unemployed	3.85	2.99
Mom Part Time	23.56	22.60
Mom Full Time	45.67	45.55
Mom Not Looking for Work	26.90	28.80
Parents Expect Less than HS	0.00	0.25
Parents Expect HS Grad	7.21	7.76
Parents Expect Some College	20.19	14.09
Parents Expect Finish College	72.60	77.80
Parents Don't Read to Child	0.96	1.23
Parents Read 1-2x a Week	24.04	17.40
Parents Read 3-6x a week	31.25	35.64
Parents Read Daily	43.70	45.80
Large or Mid Size City	47.60	38.30
Large or Mid Size Suburb	24.04	37.98
Rural	28.40	23.70
Percent Free/Rd Lunch in Sch	47.67(28.99)	32.93(28.32)
Sch Receives Title I	85.10	60.61
Sch 0-20% Language Learners	30.77	55.75
Sch 20-40% Language Learners	12.02	17.91
Sch 40-60% Language Learners	4.33	5.92
Sch 60-80% Language Learners	22.60	10.29
Sch 80-100% Language Learners	30.30	10.20
N	208	9995

Note: Data are drawn from the ECLS-K Public Use Data.

Table 5.

Weighted, imputed, matched regression models predicting perceived mathematics competence, perceived peer competence, internalizing behavior, and externalizing behavior at 5th grade

Perceived Mathematics Competence								
	Model 1		Model 2		Model 3		Model 4	
	β	se	β	se	β	se	β	se
Time in Charter	0.03	0.02	0.05*	0.03	0.03	0.02	0.05*	0.02
Poor at K	0.01	0.13	0.07	0.15				
Poor at 5th					0.04	0.12	0.13	0.15
Poor at K*Time			-0.05	0.05				
Poor at 5th*Time							-0.08	0.06
Perceived Peer Competence								
	Model 1		Model 2		Model 3		Model 4	
	β	se	β	se	β	se	β	se
Time in Charter	-0.004	0.02	-0.03	0.02	-0.004	0.02	-0.01	0.03
Poor at K	-0.05	0.13	-0.17	0.15				
Poor at 5th					-0.14	0.12	-0.19	0.16
Poor at K*Time			0.10**	0.05				
Poor at 5th*Time							0.05	0.06
Internalizing Behavior								
	Model 1		Model 2		Model 3		Model 4	
	β	se	β	se	β	se	β	se
Time in Charter	-0.03	0.02	-0.03	0.02	-0.03	0.02	-0.03*	0.02
Poor at K	0.02	0.10	0.001	0.12				
Poor at 5th					0.05	0.11	0.02	0.13
Poor at K*Time			0.02	0.04				
Poor at 5th*Time							0.03	0.05

Externalizing Behavior								
	Model 1		Model 2		Model 3		Model 4	
	β	se	β	se	β	se	β	se
Time in Charter	-0.02	0.02	0.00	0.02	-0.02	0.02	-0.02	0.02
Poor at K	-0.12	0.15	-0.02	0.17				
Poor at 5th					-0.003	0.12	-0.03	0.14
Poor at K*Time			-0.08*	0.05				
Poor at 5th*Time							0.03	0.05

Note: Data are drawn from the ECLS-K Public Use Data. *N*=3,752. All models were weighted using jackknife replicate weights J2_6FC1-90 and include all covariates from the propensity-matching model.
*p<0.10, **p<0.05

Figure 1.

Predicted perceived mathematics competency by early deprivation and time spend in charter schools in standard deviation units

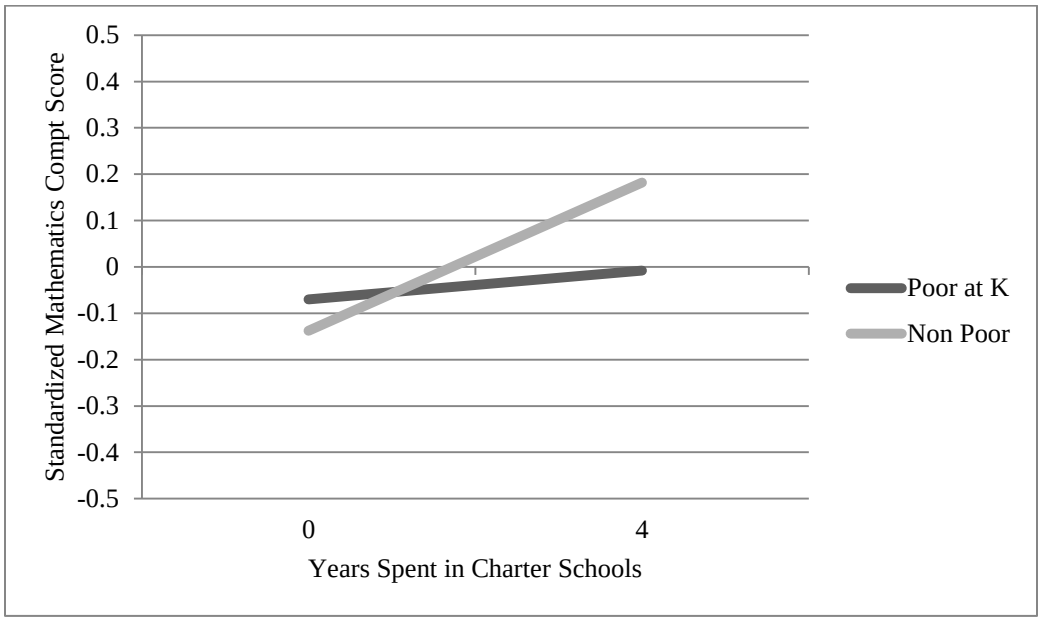


Figure 2.

Predicted perceived peer competency by early deprivation and time spend in charter schools in standard deviation units

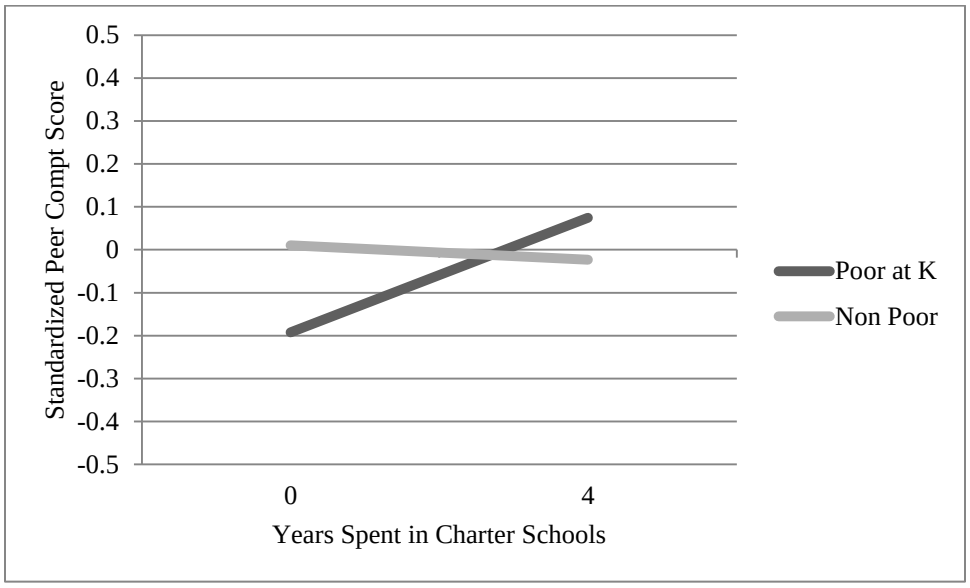


Figure 3.

Predicted levels of internalizing behavior by early deprivation and time spend in charter schools in standard deviation units

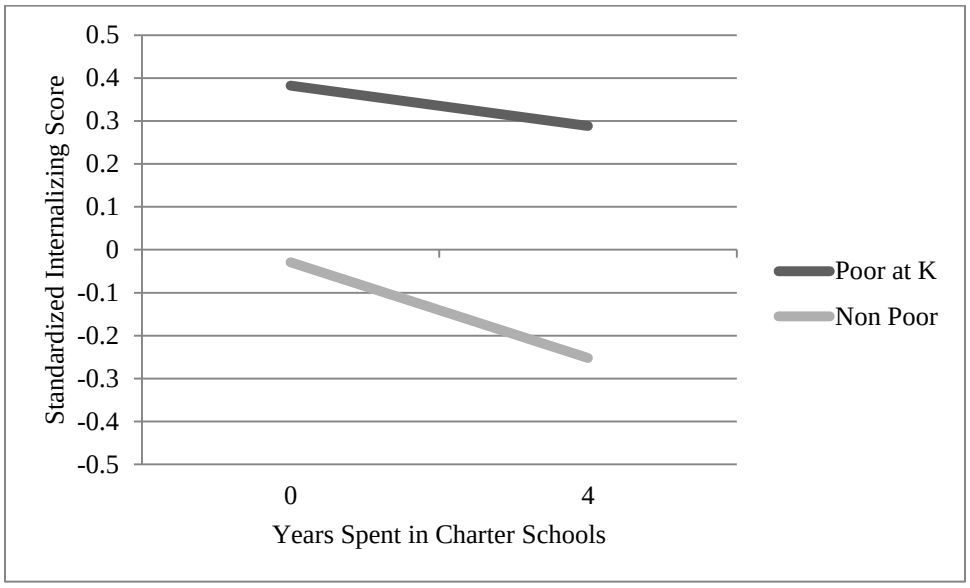
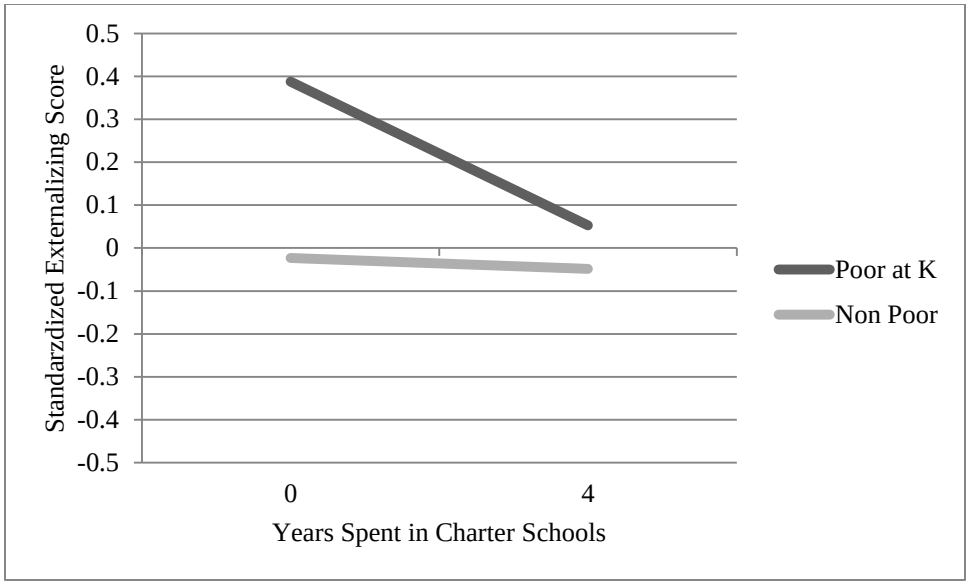


Figure 4.

Predicted levels of externalizing behavior by early deprivation and time spend in charter schools in standard deviation units



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