

RESEARCH ARTICLE

The Longitudinal Process of Early Parent Involvement on Student Achievement: A Path Analysis

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This longitudinal study investigated the process whereby early parent involvement in preschool affects student achievement from kindergarten through 6th grade. Participants were 1,539 low-income, mainly African American children and their mothers, in the Chicago Longitudinal Study. Program children (N = 989) received one or two years of the Child-Parent Center (CPC) program – a preschool intervention that strongly promoted parents' development of parent involvement skills within the school and at home. Children from similar backgrounds who did not attend the CPC, but participated in available local resources (e.g. day care), were obtained as a comparison group (N = 550). Path analysis revealed an interactive process among parent involvement, academic achievement, and children's motivation. Early parent involvement directly influenced kindergarten achievement, which in turn influenced first grade student motivation. Highly motivated children then encouraged parents to continue involvement. The cyclic nature of this process across elementary school was observed. The model accounted for 61% of the variance in 6th grade achievement. Findings suggest that early parent involvement promoted in the CPC program, sets the stage for subsequent parent involvement, student motivation, and academic achievement throughout early and middle childhood.

Educators, parents, and educational researchers are concerned about the gap in academic achievement evident between low-income African American and Caucasian children in the United States, whereby African American children are on average scoring 8 points lower than White students on tests of reading achievement (with a mean of a 100 and a standard deviation of 15) by the time they begin kindergarten (Duncan & Magnuson, 2005). According to Duncan and Magnuson (2005), this achievement gap not only continues, but also widens across elementary school. This gap has been a concern for both researchers and policy makers since the dissemination of the highly publicized Coleman Report by the U.S. Department of Education during the Johnson administration (Coleman et al., 1966).

As suggested by James Coleman over thirty years ago, there is now empirical evidence that parent involvement can significantly reduce this achievement gap (e.g. Lee & Bowen, 2006). Research thus far has shown that parent's participation in school activities has been consistently

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associated with achievement gains as well as enhanced socio-emotional development in children (e.g. Barnard, 2004; Fan & Chen, 2001; Jeynes, 2005; Lee & Bowen, 2006; Sheldon, 2002; Sheridan, Knoche, Edwards, Bovaird, & Kupzyk, 2010; Sheridan, Eagle, & Dowd, 2005). Furthermore, childhood interventions with a focus on parent involvement, such as the Child-Parent Center (CPC) program, have successfully increased achievement among low-income African American populations (e.g. Reynolds et al., 2011). Findings thus far suggest that parent involvement is a critical element in increasing student achievement (Fan & Chen, 2001; Mattingly et al., 2002) and may serve as a means to reduce the achievement gap between White students and low-income racial minority groups (Jeynes, 2007). However, the mechanisms through which parent involvement has a significant and long-term impact on children's achievement is still unknown.

Although there is an abundance of research indicating the positive contribution of parent involvement in school on children's and adolescents' academic achievement (e.g. Barnard, 2004; Christenson & Carlson, 2005; Fan & Chen, 2001; Jeynes, 2005; Lee & Bowen, 2006; Sheridan, Knoche, Kupzyk, Edwards, & Marvin, 2011), the developmental processes by which parent involvement in preschool has an effect on academic achievement later in middle childhood are largely unexplored. Given research findings indicating that there is an association between student motivation and academic achievement (e.g. Grolnick & Slowiaczek, 1994; Gonzales-DeHass, Willems, & Doan Holbein, 2005), it is possible that student motivation acts as a mediating variable explaining the persistent influence of early parent involvement on later achievement. However, very little work has been done examining motivation as a potential mediator and the majority of the studies examining the association between parent involvement and children's socio-emotional development, including motivation, have primarily been cross-sectional (Nokali, Bachman, & Votruba-Drzal, 2010).

According to Duncan and Magnuson (2005), the achievement-gap exists at a very early age – even before children start school. It is thus imperative to focus on early parent involvement in preschool as it may provide a foundation for subsequent processes and continue to have a persistent impact on children's academic achievement longitudinally during a period when the gap in achievement is increasing between African American and White children. The current study specifically examines the interactive processes by which early parent involvement in preschool affects later academic achievement in middle childhood, and the potential mediating role of motivation in that process.

Defining Parent Involvement

Parent involvement is a broad construct consisting of multiple elements. Epstein has developed a framework including six typologies of parent involvement derived from examining parent involvement within the school context (1992; 1994; 2005). There is still much debate over whether children benefit most from a specific type of parent involvement (e.g. parents volunteering in school events vs. parents helping children with their homework at home).

To address the issue of identifying specific types of effective parent involvement, Fan and Chen (2001) conducted a meta-analysis examining the effectiveness of various parent involvement intervention programs aimed at improving children's academic achievement. Although all types of parent involvement influenced children's development, results from the meta-analysis of parent involvement influences on cognitive achievement indicated that parent

involvement in school was a critical factor in determining children's academic achievement in grade school. Although variations in the definition exist, parent involvement in school is generally measured as parents' participation in school related activities and has been linked to numerous achievement outcomes (e.g. helping with homework, attending extracurricular activities, attending parent-teacher conferences, volunteering in the classroom; see, for example, Christenson & Rounds, 1992; Bogenschneider, 1997; Izzo, Weissberg, Kasrow, & Fendrich, 1999; Lee & Bowen, 2006; Steinberg et al., 1992). As such, the focus of this paper is on parent involvement within the context of school activities.

A theoretical explanation describing the influence of early parent involvement on later achievement is needed. The "five hypothesis model" developed through the examination of long-term effects of the CPC intervention (Reynolds, Ou, & Topitzes, 2004) integrates five disparate hypotheses regarding the mechanisms underlying the contribution of early childhood education interventions and provides a broad framework for examining the relation between early childhood education interventions and academic achievement. Of particular importance to the present study, this model suggests pathways through cognitive achievement, family influences, and student motivation. The five hypothesis model is a useful tool to help organize and understand the direction of various effects impacting educational outcomes. However, as the model captures processes within a large time period, it lacks the specific identification of micro-processes that occur across development. Furthermore, for the same reason, the model also does not explain how cognitive, family, and motivation pathways interact with each other across time.

Childhood Parent Involvement Influences Achievement

Early parent involvement in the school influences numerous areas of children's cognitive development. Preschool parent involvement is associated with strong pre-literacy skills even after controlling for socioeconomic status (Arnold, Zeljo, Doctoroff, & Ortiz, 2008). This effect of early parent involvement on early achievement is evident through both direct and indirect effects (Reynolds, 1989; 1991; 1992). Reynolds (1989) examined the influence of numerous variables as a predictor of first grade reading achievement and found that early parent involvement, student motivation, and kindergarten achievement had significant direct and indirect effects. In a subsequent analysis, Reynolds (1991) examined first and second grade achievement and found indirect effects of parent involvement -the effect of student motivation on achievement was explained through parent involvement. Further highlighting the importance of early parent involvement and examining long-term outcomes of parent involvement, Miedel and Reynolds (1999) found that parent involvement during preschool and kindergarten predicted lower rates of retention and special education placement through the eighth grade. Moreover, early elementary parental school involvement has been found to have a positive influence on academic achievement into adolescence for urban African American and Caucasian children as well for both boys and girls (Jeynes, 2005). Overall, results from extant literature suggest that parent involvement has a very strong influence on student achievement.

Furthermore, longitudinal studies have demonstrated the long term and cyclic influence of parent involvement on achievement. Children's achievement in first grade has been found to directly encourage subsequent parent involvement in third grade, which then directly affects subsequent achievement (Englund, Luckner, Whaley, & Egeland, 2004). Moreover, even after controlling for background characteristics and risk factors, parent involvement in school is

significantly associated with lower rates of high school dropout, increased on-time high school completion, and higher levels of educational attainment (Barnard, 2004). Research findings suggest that the process occurring between parent involvement and academic achievement is cyclic beginning early in a child's life and that parent involvement and achievement influences one another throughout childhood and adolescence. This persistent effect indicates the influential power of early parent involvement on children's later academic achievement. However, it is still unclear *how* parent involvement in schools influences students' academic achievement.

To date, numerous studies have provided evidence for the correlation between parent involvement and children's academic success (e.g. Fan & Chen, 2001; Hoover-Dempsey & Sandler 1997; Mattingly et al., 2002). Yet the positive contribution of parent involvement is not limited to children's academic success but also affects children's social and emotional development. Thus the association between parent involvement and socio-emotional characteristics (e.g. student motivation) also deserves further examination (Amato, 2005). Student's motivation to do well in school may play an important role in the cyclic process between parent involvement and academic achievement (Grolnick & Ryan, 1989; Reynolds et al., 2004). Although parent involvement is very clearly an important factor contributing to children's cognitive development, children's motivation may provide a critical linkage between parent involvement and school achievement across childhood.

Parent Involvement Influences Motivation

A growing body of research has demonstrated the benefits of parent involvement for social functioning (Izzo et al., 1999; McWayne et al., 2004; Reynolds, 1989; Rimm-Kaufman, Pianta, Cox, & Bradley, 2003; Supplee, Shaw, Hailstones, & Hartman, 2004). For example, Nokali, Bachman, and Votruba-Drzal (2010), found that elementary school children with highly involved parents had significantly higher levels of social functioning, fewer behavior problems in school, and were more motivated to perform well in school. Studies examining the association between parent involvement and children's socio-emotional development, specifically motivation, have primarily been cross-sectional however. Although cross-sectional data is important to understand associations between factors, longitudinal data is necessary to examine process questions.

Children's motivation to achieve may be a key factor mediating the relation between parent involvement and later educational achievement. High levels of parent involvement are positively associated with children's self-esteem and life satisfaction (Wenk et al., 1994). Furthermore, parents' early expectations of their children can have an effect on children's motivation and self-efficacy (e.g. Marchant et al., 2001; Reynolds & Sukhdeep, 1994). This, in turn, may contribute to children's optimism about life and promote a sense of self-competence, influencing individual's educational and occupational attainment in the long-term.

Studies of elementary and high school students (e.g., Gonzales-DeHass, Willems, & Doan Holbein, 2005) show a beneficial relation between parental involvement and motivation. Gonzales-DeHass and colleagues (2005) propose that parental involvement positively affects students' perceived control and competence, offers a sense of security and connectedness, and helps students to internalize educational values. Gonzales-DeHass and colleagues also propose that student motivation encourages parent involvement. Thus, parent involvement may

cyclically influence students' ability to academically succeed by affecting individual characteristics (e.g. motivation), which in turn impact subsequent parent involvement. This cyclic process among parent involvement, student motivation, and school performance has been found among middle school children (Grolnick and Slowiaczek, 1994) but the unfolding and development of this process has not been examined in early childhood.

Motivation Influences Academic Achievement

Student motivation may also play an important role in children's academic achievement, as motivated children want to do well in school and thus put in more effort. Considering the students' influence on their own achievement, Wigfield and Eccles (2002) examine the association between children's motivation and academic achievement. They assert that children's motivation to do well starts very early and develops in complexity as they age. Wigfield and Eccles theorize that early in the child's schooling career, young children are optimistic about learning and are highly motivated and positively perceive learning in school, relative to their later years. Therefore, if children are most receptive to motivation early in childhood and the effect of motivation carries forward through children's academic careers, there is a need to understand how to foster motivation early in childhood. After examining the influence of parent involvement on students' motivation, Gonzalez-DeHass (2005) suggest that perhaps students' motivation influences parent involvement, which fuels subsequent student motivation. This possibility, however, has not been systematically examined from early childhood throughout middle childhood.

Further evidence suggests that motivation is important not only in how children value tasks, but also in how well they perform on tasks. In a 1990 study, Gottfried examined the effects of children's self-rated motivation on later measures of achievement, IQ, and perception of competence in various subjects. She found that children who had higher levels of motivation received better grades and higher ratings of achievement by teachers (though not standardized test scores). Further, children who were highly motivated at ages 7 and 8 were more likely to be highly motivated at age 9, even above and beyond their IQ, achievement, and other factors (Gottfried, 1990). Therefore, it is not only possible for achievement motivation to affect actual achievement, but also to affect later motivation.

As researchers begin to understand the dynamic process of parent involvement, student motivation, and student achievement, it is clear that children play an active role in continuing the process. Related literature thus far has provided insight for specific links between parent involvement and achievement, parent involvement and motivation, and motivation and achievement. However, the interrelation among these constructs and the influences of early foundational processes - early parent involvement, early motivation, and early academic achievement have not been assessed and require further attention. This investigation is necessary to understand the interactive developmental process occurring between parent involvement, student motivation, and children's academic achievement prior to school age and across middle childhood. It has been suggested that in order to clarify the direction of influences, statistical methods such as path analyses and structural equation modeling be employed (Gonzalez-DeHass, 2005).

The purpose of the present study is to examine the developmental process whereby early parent involvement in preschool initiated through the Child-Parent Center intervention influences

children's later academic achievement in middle childhood. More specifically, we ask the question, "What is the process by which early parent involvement (i.e., during preschool and the kindergarten years), as a result of the CPC intervention, influences later parent involvement, childhood motivation, and achievement in elementary school? This question uniquely examines the role of student motivation within the context of parent involvement in the CPC program – an issue that has never been addressed in previous studies examining CPC intervention effects. We use a path analysis to examine the process whereby parent involvement in preschool contributes to later parent involvement, motivation, and academic achievement across the first six years of school.

METHODS

Sample

The sample for this study was taken from the Chicago Longitudinal Study (codebook; Chicago Longitudinal Study, 2005), a prospective study of 1,539 racial minority children (93% African-American, 7% Hispanic) who attended the government-funded Child-Parent Center (CPC) pre-kindergarten program ($n = 989$) in Chicago Public schools in 1983-1985 (Reynolds, 2000) for at least one year, and comparison children ($n = 550$) who did not attend the CPC program but were also from low-income Chicago neighborhoods. These comparison children were of the same age as the CPC program children, and they participated in an alternative all-day kindergarten program in 5 randomly selected Chicago public schools serving low-income children. Although the original sample consisted of 1,539 children, of these, 8 were missing valid identification and thus data on 1,531 participants were utilized in the present study (for additional information on the sample see the codebook; Chicago Longitudinal Study, 2005).

The CPC program is a Title 1 funded pre-kindergarten program located in the poorest neighborhoods of Chicago. A central operating principle of the CPC is that parent involvement is a critical force in children's development. Direct parent involvement in the program is expected to enhance parent-child interactions, parent and child attachment to school, social support among parents, and consequently promote children's school readiness and social adjustment. The centers make substantial efforts to involve parents in the education of their children both at school and at home. At least one-half day per week of parent involvement in the program is required.

Furthermore, the unique feature of the parent program is the Parent Resource Room, which is physically located in the CPC, adjacent to the classrooms. A full-time staff, the Parent-Resource Teacher, organizes the parent room in order to implement parent educational activities, initiate interactions among parents, and foster parent-child interactions. Parents may also attend GED classes at the centers. In addition to participating in Parent Resource Room activities (e.g., arts & craft projects), parents volunteer in children's classrooms, go on class field trips, help prepare breakfasts and lunches, and engage in education and training activities. Each CPC site also has a School Community Representative – a hired staff, who is also a member in the community – who conducts home visits and outreach to engage difficult to reach families. The Parent Resource Teacher, with the help of the School Community Representative, encourages and provides opportunities for parent involvement and engagement in the school, home, and community. Over the past three decades, the same types of parent involvement activities have continued to be encouraged throughout all CPCs in the Midwest. As described, parent

involvement is a key feature of the CPC program, and thus was assessed within the CPC context in the present study.

Children in the intervention group and comparison group were well-matched on child and family characteristics such as race/ethnicity, gender, and family risk factors. Means and standard deviations for both the CPC and comparison group are presented in Table 1. The sample was evenly split between males (50 percent) and females (50 percent). Our CPC participants ($n=988$) attended the CPC program for at least 1 year (of those, 534 children attended CPCs for two years). The comparison group did not attend CPC preschool, but did attend a full-day kindergarten program within Chicago Public Schools. Our study sample is comprised of children from low-income families. More than three-fourths of the sample had single mothers at the time their birth ($n = 1,169$), and more than 80% ($n = 1,281$) were eligible for the free lunch program (see Table 1 for further demographic details).

TABLE 1
Means and Standard Deviations for Matched Child/Family Characteristics

| Child/Family Characteristics | CPC Participants N = 988 | Non-CPC Participants N = 543 |
|--|--------------------------------|------------------------------------|
| Males | 48% (476) | 53% (287) |
| African-American | 93% (916) | 93% (507) |
| Hispanic | 7% (72) | 7% (36) |
| Single mother (age 0-3) | 77% (758) | 76% (411) |
| Mother age less than 18 at time of child's birth (age 0-3) | 16% (154) | 17% (95) |
| 4 or more children in household (age 0-3) | 16% (158) | 18% (98) |
| AFDC (now TANF) participation (age 0-3) | 63% (623) | 62% (335) |
| Eligible for free lunch (age 0-3) | 84% (832) | 83% (449) |
| 60% or greater poverty in school attendance area (age 0-3) | 78% (767) | 73% (398) |
| Mother did not graduate from HS (age 0-3) | 51% (503) | 60% (324) |
| Mother not employed (age 0-3) | 67% (665) | 64% (348) |

Notes: Numbers in parentheses indicate number of participants with corresponding characteristic. Chi-square tests were conducted on each variable to test for significant differences between groups. Only one variable, "Mother did not graduate from HS (age 0-3)" was statistically different between groups (p value = .001). Further investigation showed that this difference was only significant for females in the sample; males in the sample were not significantly different.

Measures

Child-Parent Centers participation at preschool. CPC participation was coded as a continuous variable indicating the number of years participated in the program. A child was coded as 0 if they did not participate in the Child-Parent Centers, 1 if they participated for 1 year, and 2 if they participated for 2 years. CPC participation is not a group based categorical nor dichotomous measure, but rather a continuous measure. A child's participation was obtained from school records and parent surveys.

Achievement in kindergarten, 3rd, 6th grades. The Iowa Test of Basic Skills (ITBS; Hieronymus, Lindquist, & Hoover, 1980; Hieronymus & Hoover, 1990) was administered each year of elementary school from Kindergarten through 6th grades. In the analyses reported herein, the Kindergarten assessment was the 35 item word analysis subtest of pre-reading skills (reliability = .87; $M = 59.71$, $SD = 13.68$). For 3rd ($M = 97.05$, $SD = 16.84$) and 6th grades ($M = 123.68$, $SD = 17.78$) the ITBS reading comprehension subtests for the corresponding grades (national norms for 1988) are included (internal consistency reliability at 3rd and 6th grade > .90; Reynolds, 2000).

Parent involvement. Parent involvement within the CPC context emphasized parent involvement related to children's schooling. All CPC parents were required to participate in events and activities for a minimum of one half day every week. Parents were especially encouraged to attend events held within the school environment- i.e. workshops in the parent resource room co-located in the CPC, volunteering in children's classrooms, and assisting teachers on class field trips. To appropriately assess parent involvement as defined within the CPC program, this study measured the variety of activities that parents participated in, among those that were encouraged in the CPC model. Data on all CPC parents were used in the present study's analyses as all parents were involved and engaged in the CPC program, to varying degrees. Although this CPC model was developed in the 1960's and the sample families participated in the program during the mid-80's, as these CPCs continue to operate under the same parent involvement model, these assessments of parent involvement remain relevant across time.

Parent involvement in preschool. Parents were surveyed retrospectively (in grade 11) about their involvement in various activities when their children were in preschool (age 3-4). Parents answered "yes" or "no" on a checklist of the following activities: "attended programs in the parent resource room", "attended school meetings", "attended school assemblies", "gone on class field trips", "volunteered in classroom (helped the children or teacher)", "received a home visit from teacher or other staff member", "has a parent teacher conference", "dropped off or picked up my child from preschool or kindergarten". Each parent's responses were summed for a total possible score of 8. The mean score on this item was 5.83, with a range of 0-8, and standard deviation of 1.83. In a prior study of parent involvement of the Child-Parent Centers that use this measure (Meidel, 1999), validity was established by correlating the included retrospective parent reports taken at grade 11 with parent reports taken at 2nd and 4th grade. It was found that the retrospective and prospective reports were significantly correlated ($p < .01$). Because parent involvement has been found to be relatively stable over time from preschool to the early grades (Izzo et al., 1999), we feel confident that this retrospective parent report provides evidence to the validity of the measure.

Parent involvement in grades 1-3 and grades 4-6. Teachers were surveyed about each parent's involvement in school activities during grades 1-6. In each year, teacher rated "parent(s) participate in school activities" on a scale of 1-5 with 1="poor/not at all", 2="below average/some", 3 = "average/satisfactory", 4 = "above average/good", 5 = "excellent/much". Available scores for grades 1-3 (range = 1-5, $M = 2.54$, $SD = 0.98$) and grades 4-6 (range = 1-5, $M = 2.49$, $SD = 1.05$) were averaged to obtain one score for each time period. If data were missing from one of the years during the respective time period, the average of the two available

years was taken. If only one year was available, then that year was used for data analysis purposes. Factor analyses established this measure's construct validity, and previous studies have found this measure to have a high degree of reliability (alphas > .90; Reynolds, 2000).

Student academic motivation in kindergarten, grade 1 and grades 3-4. Teachers were surveyed each year about each student's academic achievement motivation on several items. Teachers responded on a 1-5 scale with 1="poor/not at all", 2= "below average/some", 3 = "average/satisfactory", 4 = "above average/good", 5 = "excellent/much" for each item in each year. Items at each grade were combined and averaged to obtain an average composited score for each grade. The items in Kindergarten were "likes reading and reading readiness activities", "finishes work", and "is eager to learn". Items in grade 1 were "shows interest in learning", "reads for enjoyment", and "completes work according to instructions". The mean score at Kindergarten/grade 1 was 3.36, with a range of 1 to 5, and a standard deviation of 1.13. Items in grade 3 and 4 were "learns easily" and "is motivated to learn." The mean score at grades 3-4 was slightly lower, 3.17. The range was 1-5 with a standard deviation of 1.07. Both the kindergarten and 3rd/4th grade measures of motivation were found to be highly reliable (5 items; $\alpha = .86$; 4 items; $\alpha = .84$, respectively).

Risk index. Eight risk factors from ages 0-3 (pre-intervention) comprise this index which was used as a control variable ($M = 4.52$, $SD = 1.69$). If each risk factor was present at any point from age 0-3 years (except for AFDC information, which was measured by age 8), it was coded as 1. The eight factors were summed to create a scale of 0-8. Risk factors include: single mother, mother age less than 18 at time of child's birth, 4 or more children in household, AFDC (now TANF) participation, mother unemployed, mother did not graduate from high school, eligible for free lunch, 60% or greater poverty in school attendance area. Information for these risk factors was collected from administrative records as well as parent surveys.

Child's gender. Boys were coded 1, girls as 0.

Missing Data

Full information maximum likelihood estimation (FIML) was used to allow analysis of the full sample using MPlus (Muthén&Muthén, 2010). This method fits the model to the non-missing values for each observation. For computations using missing data, FIML estimation has been shown to perform adequately for both missing completely at random and missing at random data sets. Further, FIML estimation has all of the strengths of single or multiple imputation (Widaman, 2006). Table 2 describes the extent of the missing data. About half of the data for the early parent involvement variable were missing due to a low response rate by parents on the retrospective survey. Recognizing this as a significant amount of missing data, we ran all models with the full sample ($n = 1,531$) as well as the sample that had early parent involvement data ($n = 765$). Although background characteristics differed on several factors (e.g. CPC participation, kindergarten achievement, mothers' education) we obtained nearly identical results with the full sample as with the complete data sub-sample; therefore, we present results for the full sample only.

TABLE 2
Comparing Cases with Missing or Non-Missing Data for Early Parent Involvement

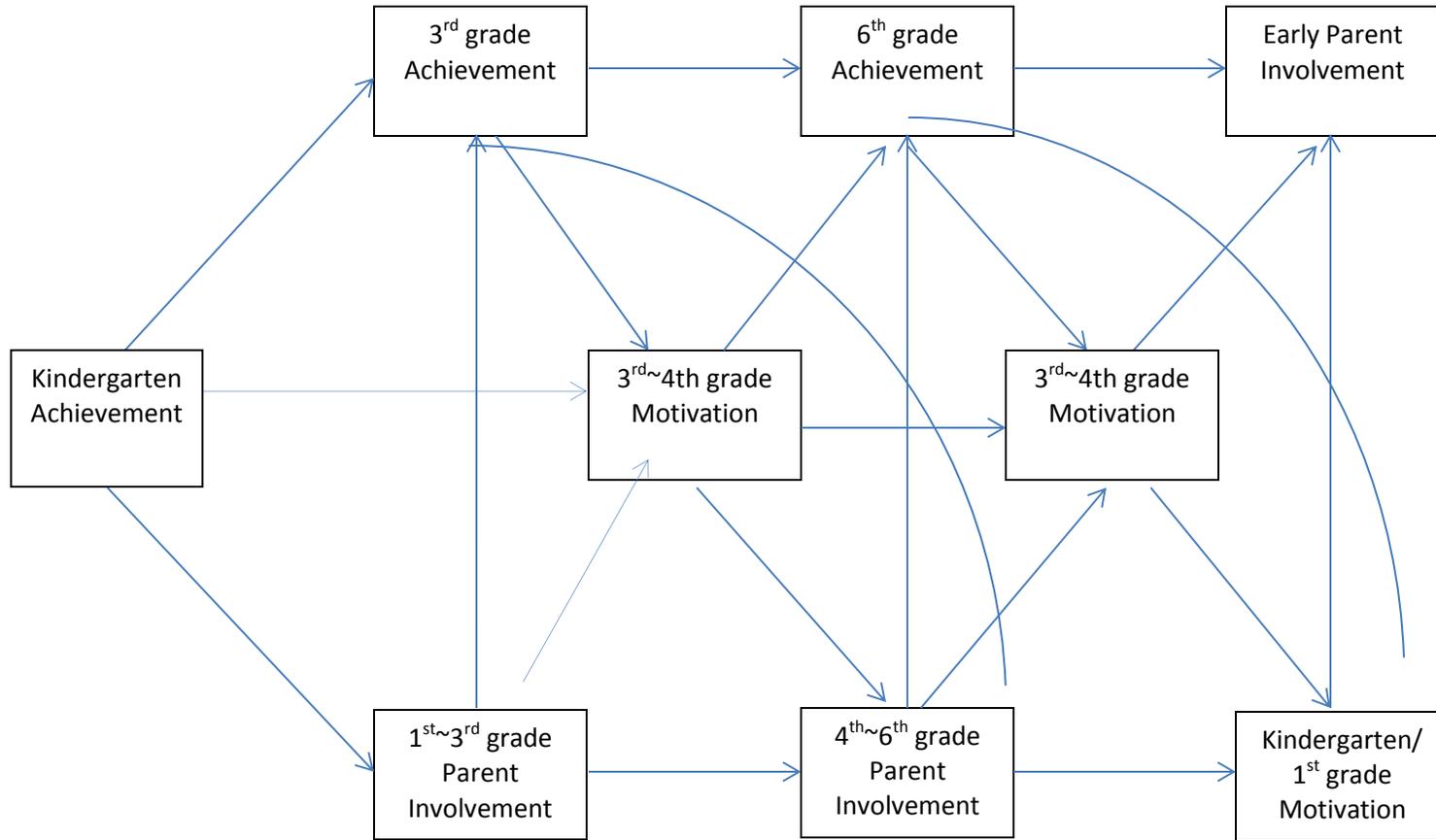
| | Missing Early PI | Not Missing Early PI | <i>p</i> -value |
|--|---------------------|-------------------------|-----------------|
| Any CPC Preschool | 61% | 68% | 0.003 |
| K achievement | 58% | 61% | 0.004 |
| Males | 53% | 47% | 0.028 |
| African-American | 91% | 95% | 0.009 |
| Single mother (age 0-3) | 76% | 77% | n.s. |
| Mother age less than 18 at time of child's birth (age 0-3) | 18% | 15% | n.s. |
| 4 or more children in household (age 0-3) | 17% | 16% | n.s. |
| AFDC (now TANF) participation (age 0-3) | 65% | 60% | 0.045 |
| Eligible for free lunch (age 0-3) | 84% | 83% | n.s. |
| 60% or greater poverty in school attendance area (age 0-3) | 77% | 75% | n.s. |
| Mother did not graduate from HS (age 0-3) | 57% | 51% | 0.012 |
| Mother not employed (age 0-3) | 66% | 66% | n.s. |

Data Analysis Plan

The CPC program emphasizes parent involvement as an integral component of an effective early childhood education experience. Participation in the CPC program (compared to children not involved in the CPC program) sets the stage for initial and continued parent involvement across childhood. We sought to test how CPC participation initiates higher levels of early parent involvement that then cascades to have an effect on early achievement. A path analysis was conducted as the primary model for analyzing the process among CPC participation, early parent involvement, subsequent parent involvement, children's motivation, and academic achievement (Figure 1). Based on previous literature and the five hypothesis model, we predicted that the early parent involvement as part of the CPC pre-kindergarten initiates a cascade of influences through its effect on early achievement, later parent involvement, and children's motivation to perform well in school. Given research linking early parent involvement to achievement and motivation across a variety of periods over development, we also predicted a cyclic process whereby early parent involvement contributes to achievement and student motivation, which then independently influence subsequent parent involvement, motivation, and achievement. Prior to entering achievement scores in the path analysis model, the ITBS achievement scores were divided by 10 to maintain a similar scale with the other variables in the model (i.e. parent involvement, motivation). We then tested the proposed path model using MPlus version 6.1 (Muthén&Muthén, 1998-2010). Furthermore, MPlus was used to obtain bootstrapped standard errors for the indirect effects.

The Comparative Fit Index (CFI), the Root Mean Square Error of Approximation (RMSEA), and the Standardized Root-Mean-Square Residual (SRMR) were evaluated to determine whether the model was an acceptable fit of the data. A model is usually considered having an acceptable fit when the CFI is at .90 or above and the RMSEA or SRMR is at .08 or less (Hoyle, 1995; Hoyle &Panter, 1995; McDonald & Ho, 2002).

Figure 1. Path analysis examining preschool intervention, parent involvement, achievement and motivation across childhood



RESULTS

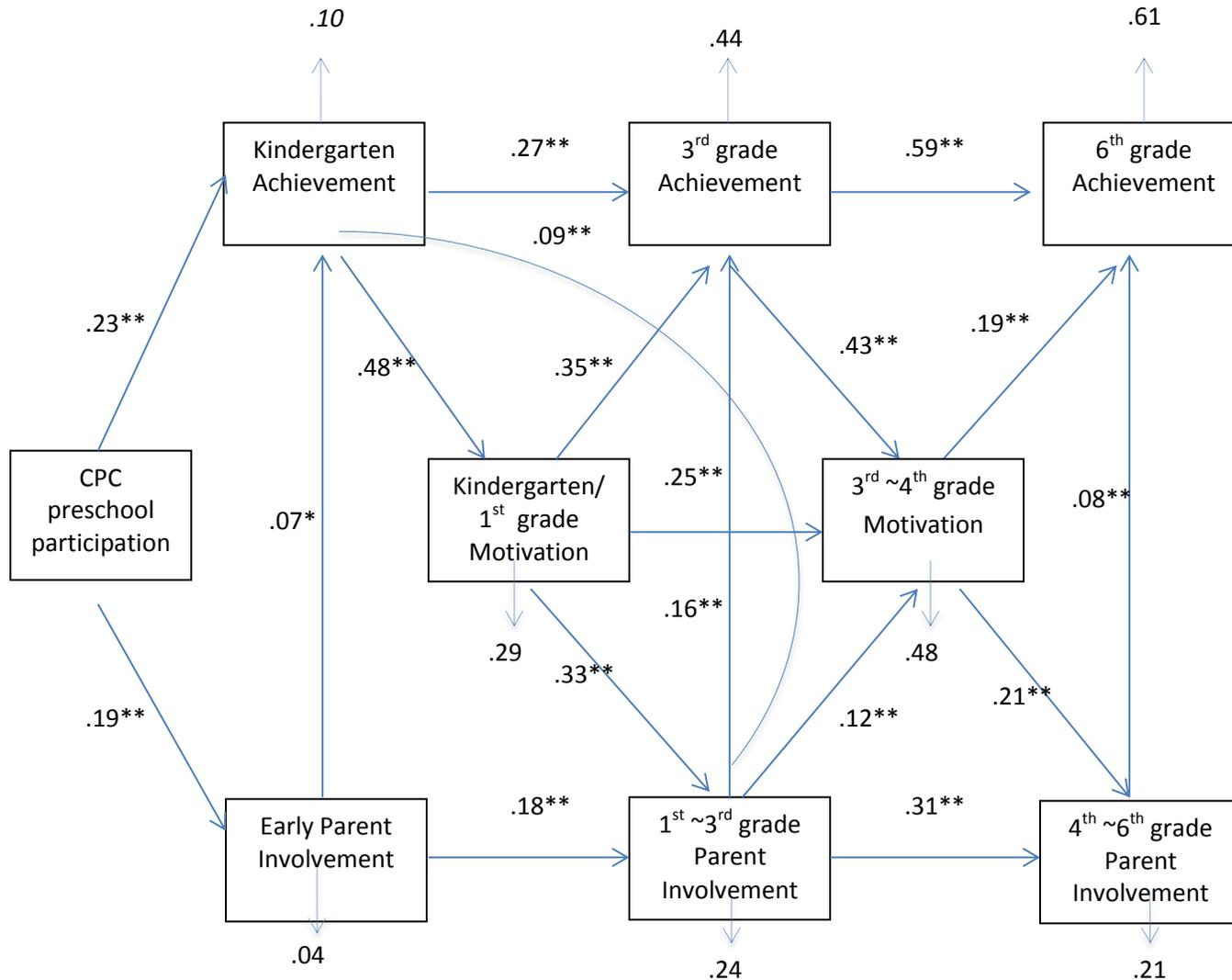
Correlations

To examine the associations among the variables, we calculated Pearson correlations. Means and standard deviations are also noted (Appendix 1 and 2). On average, participants had one year of CPC participation, as they were evenly split among no CPC, one year of CPC, and two years of CPC participation. Parents, who on average were involved in 5~6 school activities during preschool, were rated yearly as “satisfactory involvement” by teachers during grades 1~6. Moreover, teachers on average rated yearly student motivation as “satisfactory” during kindergarten ~ 4th grade. All zero-order correlations among the variables were statistically significant at $p < .01$ with the exception of 3rd ~4th grade motivation with early parent involvement.

Path Analysis

Results of the path analysis for the full model are shown in Figure 2. The overall model was a good fit to the data, $\chi^2(15, N = 1,531) = 83.65, p < .001$, root-mean-square error of approximation (RMSEA) = .06, 90% CIs [.044, .066], comparative fit index (CFI) = .98, standardized root mean square residual (SRMR) = .02, and accounts for 61% of the variance in children’s achievement in third grade.

Figure 2. Results of path analysis examining preschool participation, parent involvement, student achievement, and student motivation. $N=1,531$.



Note: Control variables for path analysis include: single mother, mother age less than 18 at time of child's birth, 4 or more children in household, AFDC (now TANF) participation, mother unemployed, mother did not graduate from high school, eligible for free lunch, 60% or greater poverty in school attendance area. Unexplained variances are indicated by vertical arrows for each outcome.

TABLE 3
 Unstandardized, Standardized, and Significance Levels for the Full Model
 (Standard Errors in Parentheses; N = 1,531)

| Path model estimates | Unstandardized | Standardized | <i>p</i> -value |
|---|----------------|--------------|-----------------|
| Male → Num. CPC years | -.104 (.043) | -.062 | .016 |
| Risk → Num. CPC years | -.011 (.013) | -.022 | .385 |
| Num. CPC years → Early parent involvement | .404 (.080) | .185 | .001 |
| Male → Early parent involvement | -.153 (.138) | -.042 | .270 |
| Risk → Early parent involvement | .057 (.038) | .052 | .136 |
| Early parent involvement → K achievement | .054 (.026) | .072 | .040 |
| Num. CPC years → K achievement | .370 (.040) | .227 | .001 |
| Male → K achievement | -.200 (.068) | -.073 | .003 |
| Risk → K achievement | -.127 (.019) | -.157 | .001 |
| Early parent involvement → K~1 st gr. motivation | .032 (.021) | .052 | .129 |
| K achievement → K~1 st gr. motivation | .395 (.017) | .480 | .001 |
| Num. CPC years → K~1 st gr. motivation | -.029 (.031) | -.022 | .351 |
| Male → K~1 st gr. motivation | -.362 (.052) | -.161 | .001 |
| Risk → K~1 st gr. motivation | -.049 (.015) | -.073 | .001 |
| Early parent involvement → 1 st ~3 rd gr. parent involvement | .094 (.017) | .177 | .001 |
| K~1 st gr. motivation → 1 st ~3 rd gr. parent involvement | .282 (.024) | .325 | .001 |
| K achievement → 1 st ~3 rd gr. parent involvement | .063 (.020) | .089 | .002 |
| Male → 1 st ~3 rd gr. parent involvement | -.064 (.044) | -.033 | .142 |
| Risk → 1 st ~3 rd gr. parent involvement | -.096 (.014) | -.165 | .001 |
| K~1 st gr. motivation → 3 rd gr. achievement | .527 (.044) | .351 | .001 |
| 1 st ~3 rd gr. parent involvement → 3 rd gr. achievement | .284 (.042) | .164 | .001 |
| K achievement → 3 rd gr. achievement | .331 (.033) | .267 | .001 |
| Male → 3 rd gr. achievement | -.205 (.070) | -.060 | .004 |
| Risk → 3 rd gr. achievement | -.097 (.022) | -.097 | .001 |
| 1 st ~3 rd gr. parent involvement → 3~4 th gr. motivation | .118 (.024) | .119 | .001 |
| K~1 st gr. motivation → 3~4 th gr. motivation | .217 (.022) | .253 | .001 |
| 3 rd gr. achievement → 3~4 th gr. motivation | .246 (.015) | .431 | .001 |
| Male → 3~4 th gr. motivation | -.140 (.042) | -.073 | .001 |
| Risk → 3~4 th gr. motivation | .008 (.012) | .014 | .511 |
| 1 st ~3 rd gr. parent involvement → 4 th ~6 th gr. motivation | .332 (.033) | .308 | .001 |
| 3~4 th gr. motivation → 4 th ~6 th gr. motivation | .230 (.042) | .211 | .001 |
| 3 rd gr. achievement → 4 th ~6 th gr. motivation | -.011 (.022) | -.018 | .616 |
| Male → 4 th ~6 th gr. motivation | -.126 (.057) | -.060 | .028 |
| Risk → 4 th ~6 th gr. motivation | -.041 (.017) | -.066 | .016 |
| 3 rd gr. achievement → 6 th gr. achievement | .621 (.028) | .587 | .001 |
| 3~4 th gr. motivation → 6 th gr. achievement | .350 (.047) | .189 | .001 |
| 4 th ~6 th gr. parent involvement → 6 th gr. achievement | .140 (.035) | .083 | .001 |
| Male → 6 th gr. achievement | -.195 (.066) | -.055 | .003 |
| Risk → 6 th gr. achievement | -.054 (.020) | -.051 | .008 |

Number of years in the CPC program. Table 3 shows the unstandardized and standardized path coefficients, significance levels, and the standard errors for all paths controlling for general and early childhood risk. The number of years a child participated in the CPC program significantly predicted the child's kindergarten achievement ($\beta = .227, p = .001$) and early childhood parent involvement ($\beta = .185, p = .001$), but not kindergarten-first grade motivation.

Kindergarten achievement. As expected, kindergarten achievement significantly predicted achievement over time at both third grade ($\beta = .267, p = .001$) and sixth grade ($\beta = .587, p = .001$). Interestingly, although neither CPC participation nor early parent involvement predicted kindergarten-first grade motivation, early achievement predicted kindergarten-first grade motivation ($\beta = .480, p = .001$).

Parent involvement. Early parent involvement predicted kindergarten achievement ($\beta = .072, p = .034$) and subsequent parent involvement at first-third grade ($\beta = .177, p = .001$) and fourth-sixth grade ($\beta = .308, p = .001$). Furthermore, 4th/6th grade parent involvement predicted 6th grade achievement ($\beta = .083, p = .001$).

Student motivation. As for motivation, kindergarten-first grade motivation significantly predicted third grade achievement ($\beta = .351, p = .001$), first-third grade parent involvement ($\beta = .325, p = .001$) and subsequent motivation in third-fourth grade ($\beta = .253, p = .001$). Furthermore, student motivation in third-fourth grade continued to predict subsequent parent involvement in fourth-sixth grade ($\beta = .211, p = .001$) and sixth grade achievement ($\beta = .189, p = .001$).

Total indirect effects from early parent involvement were also examined. Early parental involvement had total indirect effects on third (.084, $p < .001$) and sixth grade achievement (.072, $p < .001$), third-fourth grade motivation (.083, $p < .001$), and fourth-sixth parent involvement (.081, $p < .001$).

Achievement pathway. A number of significant indirect paths were identified from early parent involvement to later academic achievement. First, an achievement pathway was identified wherein early parent involvement predicted kindergarten achievement and then subsequent achievement.

Parent involvement pathway. A parent involvement pathway was identified where early parent involvement influenced academic achievement in middle childhood through parent involvement in elementary school. Also, a parent-involvement-motivation pathway was found where early parent involvement predicted first-third grade parent involvement, which then predicted third-fourth grade motivation, and finally sixth grade achievement. Furthermore, a significant indirect pathway was found where early parent involvement predicted early achievement, which then predicted student motivation, and then later achievement.

Motivation pathway. Early parent involvement affected sixth grade achievement through a significant indirect path leading from early parent involvement to motivation to subsequent parent involvement and then to achievement. Highlighting motivation as a critical intermediary variable, another significant indirect path was found where parent involvement

affected achievement, which then influenced motivation leading to subsequent parent involvement, and then middle childhood achievement.

Finally, demonstrating the complex and cyclic nature of the contribution of parent involvement, the seventh indirect path identified early parent involvement as a predictor of early achievement, leading to a motivation-achievement-motivation-achievement transaction. Most indirect effects revealed an immediate association between early parent involvement and early achievement, which set up a cascade of influences on subsequent parent involvement, motivation, and achievement.

DISCUSSION

The purpose of this study was to examine the interactive developmental processes underlying the association between early parent involvement and later academic achievement as instigated by the Child-Parent Center (CPC) preschool program. We focused on the initial influence of the CPC preschool intervention on early parent involvement and early student achievement, while also highlighting the subsequent process that influences 6th grade achievement. The CPC is a high quality preschool program with a specific focus on encouraging parent involvement in the school. The CPC program has proven effective in numerous short term and long term outcomes (Reynolds, 1989; Reynolds et al., 2011), but the contribution of early parent involvement and its childhood process through student motivation on achievement, from preschool into middle childhood, had not been examined until now.

The most important finding to emerge was that early parent involvement, as instigated by CPC preschool participation, appears to initiate the process underlying the persisting and cyclic process among childhood parent involvement, achievement, and student motivation, even after controlling for early risk factors. Interestingly, there was no direct path from the CPC intervention to early motivation (i.e. kindergarten-1st grade), nor from early parent involvement to early motivation. Instead, early parent involvement predicted early achievement, which contributed to enhancing early student motivation, and in turn had an impact on subsequent parent involvement and student achievement. Thus, early parent involvement sets the process in motion through its direct effects on achievement and later parent involvement.

Early student achievement played a critical role within this parent involvement process. High achieving kindergarteners (in response to early parent involvement) are further motivated to continue to perform well in school. Recognizing their young children's academic success and motivation, parents are then further encouraged to continue to be involved in school. Observing this continued parent involvement, children are once again motivated to perform well in school, and this then contributes to continued high achievement. Thus, academic achievement throughout childhood provides a concrete measure of success, which reinforces the cyclic process of parent involvement-achievement-motivation. This process supports previous findings by Reynolds (1991), suggesting that both early parent involvement and early student achievement mediate the effects of early student motivation. Therefore, results from our study suggest that the CPC, with its focus on early parental involvement, serves as a catalyst that sets up the foundation of the early parent involvement – achievement – motivation pathway throughout childhood.

Our findings confirm the idea that motivation plays an integral role in the cycle of parent involvement and student achievement. Identifying the influence of student motivation within the

parent involvement-student achievement process is a unique contribution that adds to previous studies of CPC effects on children's development. Our path analyses revealed that children with highly involved parents perform better in school than peers without highly involved parents. Those children who perform better were highly motivated to continue to perform well in school, and this in turn appeared to encourage parents to be involved. Parents who were highly involved early in childhood continued to be involved in middle childhood, and this then motivated children to perform well in school. Thus parent involvement and student achievement influenced successive achievement and involvement through student motivation. This flow of linkages supports Becher's (1984) idea that parents of high achievers hold high expectations for their children's academic performance, and thus are engaged in involvement in children's academic life (e.g. reinforcing what children learned in school, providing opportunities to solve problems). Our findings extend Becher's ideas by adding student level characteristics into the process. Most importantly, our findings further an understanding of the developmental process of early parent involvement over time, beginning in early childhood and proceeding through middle childhood.

The persistent and cyclic process of parent involvement, student achievement, and student motivation appears to be a critical element in reducing the achievement gap. Not only is the achievement gap between African American and White students observed early in preschool and kindergarten, but the gap continues to expand during childhood and middle childhood (Magnuson & Waldfogel, 2008). Therefore, to decrease the achievement gap, interventions must aim to both reduce the achievement gap early in preschool and kindergarten and incorporate a mechanism which allows the maintenance of higher achievement in the low-income African American population. Some early interventions have successfully produced the initial gain in achievement, but failed to maintain the increased achievement throughout childhood (Currie & Thomas, 2000). Findings from our study not only provide a potential solution to initially decreasing the achievement gap, but more importantly, provide a mechanism through which the early effects of parent involvement and achievement can be carried forward throughout childhood.

LIMITATIONS

A specific strength of the present study is that the sample consisted of a largely low-income, African American population, which provides a unique opportunity for research. It is critical to examine this population because low-income children are typically starting school at a lower level and due to the achievement gap they are already behind their white classmates by kindergarten entry (Duncan & Magnuson, 2005). However, this focus on a low-income and African American sample also prevented us from examining cross-ethnic variations of the parent involvement process, where associations among parent involvement in school, student motivation, and student achievement may differ.

Furthermore, our measure of early parent involvement was a retrospective report. It would be of concern if there were low variability among parent's responses (i.e. all parents identified themselves as highly involved parents); however, there was high variability on the early parent involvement behavior measure. Furthermore, there was a significant correlation with prospectively obtained parental involvement data from K-6 teachers, suggesting the measure is valid. The retrospective parent involvement measure significantly correlated with the teacher ratings of parent involvement during grades 1-3 ($r = .20, p < .001$) and grades 4-6 ($r = .14, p <$

.001). Therefore, although it would have been better to have obtained the information prospectively, our measure captures varying levels of parent perceptions of parent involvement in preschool and provides a valid measure of early parent involvement in school.

FUTURE DIRECTIONS

This study examined the influence of early parent involvement in the school originating within the CPC preschool intervention context. However, it would be valuable to examine the effects of different types of parent involvement on student motivation (Gonzalez-DeHass et al., 2005). It is yet unclear what type of parent involvement most enhances student motivation. Even within the school, parents can be involved in numerous ways. For example, parents can volunteer in classrooms, frequently communicate with the teacher, or get involved in the PTA. Gonzalez-DeHass et al. (2005) suggest that simply increasing the frequency of involvement may not be the most effective method for increasing students' motivation, but instead the quality of involvement is more influential in enhancing student motivation.

Moreover, because ethnic variations in parent involvement in the schools and perceptions towards student motivation and achievement exist, future studies should investigate whether the associations examined in the present study are similar across different subgroups, such as socioeconomic classes and ethnicities. The majority of participants in this study consisted of low-income African American families. Our findings support previous research (e.g. Bogenschneider, 1997) that has identified the importance of parent involvement for children's achievement, especially among families that lack resources. That early parent involvement in school can have strong and persisting effects into middle childhood for motivated children from low-income families, is a critical finding noteworthy for practitioners. This is a key step in developing interventions aimed at decreasing the achievement gap between African American and White children that occurs early in childhood and maintaining the increased level of achievement for this population (Duncan & Magnuson, 2005).

Furthermore, previous studies examining parent involvement and student achievement have identified ethnic differences in the effects of various types of parent involvement (e.g. parent involvement in the school, parent communication, parental supervision) on academic achievement (Hong & Ho, 2005). Not only are there variations across ethnicities in types of parent involvement influential for achievement, but also variations in mediators that explain the association between parent involvement and achievement. Hong and Ho (2005) examined students' aspirations as a mediator of parent involvement and achievement and found that students' aspirations were consistent predictors across all four ethnic groups for initial achievement as well as subsequent academic growth. Their results support our findings of student motivation as a key mediator in the association between parent involvement and achievement. However, the role of cross-ethnic variations in types of parent involvement is still unclear, and it would be beneficial to examine the associations among varieties of early parent involvement, student motivation, and achievement across numerous ethnicities.

Our findings highlight the significant and persisting contribution of early parent involvement on student's school progress throughout childhood. Educators and practitioners can benefit from studies examining the links among early parent involvement, student motivation, and later achievement by understanding what areas to bolster during childhood. Clearly, early parent involvement sets the stage for the cascade of behaviors that lead to high student

achievement. The next application of this study is to understand how best parents can be involved and how educators and practitioners can enhance the link between early parent involvement and achievement for children from all backgrounds.

CONCLUSION

Our findings help further the field's understanding of the process underlying an early parent involvement intervention's effectiveness, and its influence on student achievement throughout middle childhood. Although the importance of parent involvement, particularly within the home-school partnership has been established in the area of education science (Christenson, 2004; Cowan, Swearer, & Sheridan; 2004), we know less of how and why this occurs. Moreover, identification of the *mechanisms* through which early parent involvement has persisting influences on children's achievement is especially important given legislation such as the Individuals with Disabilities Education Act and No Child Left Behind that requires schools to involve families in children's education. Parent involvement researchers, such as Joyce Epstein (2005) have been arguing for multilevel and longitudinal examinations of the effects of various school actions to increase family involvement. Only longitudinal, empirical analyses provide guidance to how programs can most efficiently benefit children, and how we can tailor them to be most cost-effective. The present study reveals that enhancing early parent involvement sets the child on a trajectory towards positive achievement in school and high motivation towards academics. As students perform better and are motivated to do well in school, parents then become more involved in their children's schooling, thus continuing the positive cycle of students' achievement. Although further research is needed, schools can draw on our findings to implement strategies to increase parent involvement and student motivation as an effective and compelling way to decrease the achievement gap during early childhood and create a system that maintains higher levels of academic achievement for all students.

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APPENDIX 1

TABLE 4
Descriptive Statistics of Variables Used in Path Model

| | Mean | S.D. |
|---|--------|-------|
| Year of CPC participation | .99 | .84 |
| K word analysis skills | 59.71 | 13.68 |
| 3 rd grade reading achievement | 97.05 | 16.84 |
| 6 th grade reading achievement | 123.68 | 17.78 |
| K~1 st grade motivation | 3.37 | 1.13 |
| 3 rd ~4 th grade motivation | 3.16 | .96 |
| Early parent involvement | 5.89 | 1.83 |
| 1 st ~3 rd grade parent involvement | 2.54 | .98 |
| 4 th ~6 th grade parent involvement | 2.49 | 1.05 |

APPENDIX 2

TABLE 5
Correlations Among Path Model Variables

| | Years of CPC participation | K achiev. | 3 rd gr. achiev. | 6 th gr. achiev. | K/1 st gr. motivation | 3 rd /4 th gr. motivation | Early PI | 1 st ~3 rd gr. PI |
|--|-------------------------------|--------------|--------------------------------|--------------------------------|-------------------------------------|--|-------------|--|
| K achievement | .25** | --- | --- | --- | --- | --- | --- | --- |
| 3 rd gr. achievement | .12** | .51** | --- | --- | --- | --- | --- | --- |
| 6 th gr. achievement | .13** | .48** | .74** | --- | --- | --- | --- | --- |
| K/1 st gr. motivation | .12** | .51** | .58** | .55** | --- | --- | --- | --- |
| 3 rd /4 th gr. motivation | .08* | .39** | .63** | .61** | .56** | --- | --- | --- |
| Early PI | .17** | .11* | .10* | .14** | .12* | .03 | --- | --- |
| 1 st ~3 rd gr. PI | .19** | .30** | .42** | .39** | .41** | .42** | .20** | --- |
| 4 th ~6 th gr. PI | .14** | .20** | .26** | .31** | .26** | .34** | .14** | .40** |

* $p < .01$, ** $p < .001$