
CHANGES IN PARENT INVOLVEMENT ACROSS THE TRANSITION FROM PUBLIC SCHOOL PREKINDERGARTEN TO FIRST GRADE AND CHILDREN'S ACADEMIC OUTCOMES

ABSTRACT

Between- and within-family changes in 4 dimensions of parent involvement in children's learning were examined from prekindergarten to kindergarten and from kindergarten to first grade. Children's literacy, language, and mathematics skills were individually assessed at pre-kindergarten entry and end of first grade. Parents' provision of cognitive stimulation decreased overall from prekindergarten to kindergarten ($d = -.26$) and from kindergarten to first grade ($d = -.53$), and variety of out-of-home experiences increased from kindergarten to first grade ($d = .30$). A substantial percentage of the sample increased or decreased their participation in home-based or school-based activities. The degree of change in parent provision of cognitive stimulation from kindergarten to first grade and variety of out-of-home experiences from prekindergarten to kindergarten predicted children's first-grade mathematics skills. Increases in home learning resources from prekindergarten to kindergarten were associated with higher first-grade mathematics outcomes of children with lower prekindergarten-entry mathematics skills.

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THE transition to elementary school is a major life event for young children and their parents. Each grade level presents new curriculum expectations, with an increased focus on literacy, mathematics, and related academic skills as children move from prekindergarten (pre-K) to first grade (Rimm-Kaufman & Pianta, 2000). For parents, relationships with schools may be qualitatively different in kindergarten and first grade than in pre-K programs (Cowan & Heming, 2005), perhaps entailing more invitations to participate in school-based activities (Hindman, Skibbe, & Morrison, *in press*) and shifts in parents' support of their children's learning in the family and community (Pianta & Walsh, 1996).

How children fare during the early years of formal schooling is linked in part to the nature of their parents' educational involvement at home and school. A substantial body of research indicates that the quality of home learning environments is significantly associated with improvements in children's academic outcomes, including basic skills in language and literacy (e.g., Sénéchal & LeFevre, 2002) and mathematics (e.g., Melhuish et al., 2008). Researchers also have found that parent involvement at school is significantly linked to children's academic and social outcomes in pre-K (e.g., Powell, Son, File, & San Juan, 2010) and kindergarten (e.g., Rimm-Kaufman, Pianta, Cox, & Bradley, 2003). However, there is scant longitudinal research on the nature and outcomes of parent involvement across the transition to elementary school.

This article reports a prospective, 3-year study of changes in parent educational involvement from pre-K to first grade in urban public elementary schools and the relation of the degree of change in parent involvement to children's academic outcomes. The research focused on three academic skill areas—early reading, language, and mathematics—that undergo significant development during the early years of schooling and are linked to parenting practices. Each of these areas also significantly predicts students' school achievement trajectories. For example, vocabulary knowledge at the end of first grade is strongly predictive of reading comprehension ability 10 years later (Cunningham & Stanovich, 1997), and mathematics proficiency at the beginning of kindergarten is predictive of mathematics achievement in tenth grade (Stevenson & Newman, 1986).

Advances in the Conceptualization of Parent Involvement

The theoretical and empirical literatures on parent contributions to children's learning increasingly conceptualize parent involvement as multidimensional and dynamic. Each of these advances is discussed below.

First, growing recognition of the multidimensionality of parent involvement is evident in Epstein's (1990) typology of family-school partnerships, notably the differentiated forms of parent support of children's learning at school and at home. The multifaceted nature of parent involvement also is prominently represented in major theoretical treatments related to parenting practices. For example, Bronfenbrenner's bioecological theory posits that multiple kinds of reciprocal interactions with persons, objects, and symbols are central to human development (Bronfenbrenner & Ceci, 1994; Bronfenbrenner & Morris, 2006), and Bornstein's (2006) specificity principle submits that specific parenting practices at specific times exert specific effects on child development.

The attention to multidimensionality in theories of parent involvement is unevenly reflected in research. Although some investigators have examined the relative impact of parent involvement at school and at home on children's outcomes (e.g., Fantuzzo, McWayne, Perry, & Childs, 2004), a common pattern is to examine parent involvement at home (e.g., Son & Morrison, 2010) or at school (e.g., Powell et al., 2010), or to employ a global composite measure of parent involvement at both school and home (e.g., Arnold, Zeljo, Doctoroff, & Ortiz, 2008), thereby making it impossible to examine the relation of different types of parent involvement to child outcomes. Existing measures of parent involvement in children's learning at home tend to be global in nature, encompassing a broad set of resources and activities (e.g., Fantuzzo, Tighe, & Childs, 2000) that in some measures are conceptually related to a specific outcome such as literacy (e.g., Griffin & Morrison, 1997) or mathematics (e.g., Saxe, Guberman, & Gearhart, 1987). An exception to this general pattern is the Caldwell and Bradley (1984) measure of the home environment, which includes subscales related to specific dimensions of children's learning in home and family contexts (e.g., provision of appropriate learning materials, opportunities for variety in daily stimulation).

Bioecological theory's emphasis on children's interactions with persons, objects, and symbols (Bronfenbrenner & Morris, 2006) provides a conceptual framework for considering potentially meaningful dimensions of family learning environments. The provision of learning resources at home, including symbol-rich objects such as books, is a basic dimension of parent involvement that contributes to children's outcomes such as early literacy skills (e.g., Payne, Whitehurst, & Angell, 1994). Parental teaching practices that actively engage children in learning skills and constructs pertinent to school success are another central aspect of parent involvement in children's education. For example, research on low-income preschool children indicates that children's home experiences in playing number board games is related to numerical knowledge (Ramani & Siegler, 2008), and parent-child reading interactions are linked to children's early literacy skills (Bracken & Fischel, 2008). Also, the variety of children's out-of-home experiences (e.g., visits to park) is theoretically linked to children's outcomes in Bronfenbrenner's recognition of neighborhood and community environments as important contexts for human development. Although there are some descriptive data on what parents expose their children to outside the home (for a review, see Bradley, 2002), little is known about the relation of this dimension of parent involvement to children's outcomes during the transition to school.

There are major gaps in the extant empirical literature with regard to whether dimensions of parent involvement are differentially related to specific child outcomes. Bradley and colleagues found that children's mathematics skills were positively associated with home-based learning stimulation but not with parental teaching, and there was a slightly stronger association between learning stimulation and vocabulary skills among younger versus older children (Bradley, Corwyn, Burchinal, McAdoo, & Coll, 2001). These findings illustrate the potential yield of finer-grained longitudinal analyses of parent involvement and children's outcomes but have limited pertinence to the current study because the learning stimulation measure included both materials in the home (e.g., number of books) and parent engagement of children in use of materials (e.g., reading to child); furthermore, the child sample ranged from birth to age 13 years.

Second, the view of parent involvement as a dynamic versus static variable is a major conceptual shift in the theoretical literature (e.g., Hill & Taylor, 2004) that acknowledges parents' accommodation of changes in children's development and age-graded expectations (Collins & Madsen, 2002; Holden & Miller, 1999). Few studies are designed to examine possible change over time in parent involvement, however. Typically, indicators of parenting practices (e.g., participation at school, quality of home learning environment) are assessed at one point or summed across a year and then examined in relation to concurrent or later child outcomes. Nonetheless, recent longitudinal evidence points to changes in parent involvement during the transition to school. Son and Morrison (2010) found that home learning environments (e.g., learning materials, academic stimulation) improved from 36 to 54 months of children's age by more than 1 standard deviation of the 36-month scores among 30% of a national sample of economically diverse families. The quality of home environments decreased in less than 1% of the sample. With regard to parental school involvement, Dearing, Kreider, Simpkins, and Weiss (2006) found that about equal percentages of low-income parents decreased (45%) and increased (45%) their level of school involvement from kindergarten to fifth grade. In a longitudinal study, Rimm-Kaufman and Pianta (1999) reported that there was less frequent parent-teacher contact in kindergarten compared to pre-K. Recent research also has found a decrease in parent involvement in children's learning from seventh through eighth grade (Cheung & Pomerantz, 2011).

Importantly, there is limited empirical understanding of whether changes in specific parent-involvement dimensions at specific school transition points are linked to specific child outcomes during the transition to school. Several studies have found that changes in parent involvement over time are linked to children's school-related outcomes. The degree of within-family change in home learning environments from 36 to 54 months of child age in the Son and Morrison (2010) study uniquely contributed to children's language but not to their early literacy and mathematics skills. In the Dearing et al. (2006) investigation, within-family increases in parental school involvement from kindergarten to fifth grade predicted children's literacy competence. In contrast, El Nokali, Bachman, and Votruba-Drzal (2010) found that increases in parent involvement at school and home across first, third, and fifth grade were linked to enhanced social functioning and reduced behavior problems but were largely unrelated to individual growth in language, early literacy, and mathematics skills. Although direct comparisons of child outcomes across these studies are hindered by differences in research design (e.g., age span, sample characteristics), together they demonstrate generally that changes in parent involvement during elementary school transitions are linked to children's outcomes. None of the studies specified the point(s) at which change occurred in parent involvement. Son and Morrison (2010) and Dearing et al. (2006) examined one dimension of parent involvement (home and school, respectively). The parent-involvement measure used by El Nokali et al. (2010) focused broadly on parental encouragement of education (e.g., educational attitudes) and did not differentiate between home- and school-based forms of parent involvement.

The conceptualization of parent involvement as multidimensional and dynamic calls into question the prevailing assumption that parents are relatively stable over time in levels of involvement in their children's learning and that higher (or lower) amounts of participation are consistent across different dimensions of parent edu-

cational involvement. A nuanced longitudinal examination of parent involvement recognizes that decreases in some dimensions of parent involvement may coincide with increases in other dimensions of parent involvement. Moreover, increases or decreases in different dimensions of parent involvement may represent responses to children's developmental needs and/or their school context, including curriculum expectations and grade level, as noted earlier. Accordingly, the degree of change in different dimensions of parent involvement across key points in the transition to school may be a productive variable to investigate in research on the relation of parent involvement to children's academic outcomes.

The pursuit of greater specificity in the study of parent involvement and children's outcomes also raises questions about possible differential effects of the degree of change in parent involvement during the transition to school. Interactions between children's skill levels and instructional practices are of growing interest in the research literature. For example, a growing body of studies indicates that vocabulary-knowledge interventions are differentially effective by children's initial vocabulary skills (e.g., Marulis & Neuman, 2010). Although we are not aware of published research on whether the outcomes of parent involvement differ by children's entry-level skills, this is a promising avenue to explore because findings regarding the differential impact of changes in parent involvement might help identify subgroups of children who are more (or less) likely to benefit from specific dimensions of parent educational involvement.

The transition to elementary school warrants investigation in contexts where the pre-K classroom is located in a public elementary school building and operated by a public school. Public school pre-K is a rapidly expanding segment of the early childhood education field as policy-makers seek to close academic achievement gaps at kindergarten entry. Limited research has been done on parent involvement in public school pre-K, however (Powell et al., 2010). Findings of research on transitions to public elementary schools from pre-K programs sponsored by agencies other than public schools (e.g., Head Start; Rimm-Kaufman & Pianta, 1999) may not be applicable to transitions involving public school pre-K. In addition to the possibility of children remaining in the same building for the early years of formal schooling, public school pre-K classrooms may be more closely aligned with the elementary school curriculum (Brown, 2009) and responsive to recent emphases on educational standards and accountability (Stipek, 2006) than pre-K programs sponsored by a nonschool agency.

Results of research on changes in parent involvement at home and school from pre-K to first grade may inform policies and practices designed to promote students' successful transition to school, including improved academic outcomes. Findings of survey research employing national and multistate samples indicate that typically there is some engagement of parents in practices aimed at facilitating the transition to pre-K (Rous, Hallam, McCormick, & Cox, 2010), kindergarten (Early, Pianta, Taylor, & Cox, 2001; LoCasale-Crouch, Mashburn, Downer, & Pianta, 2008; Pianta, Cox, Taylor, & Early, 1999; Schulting, Malone, & Dodge, 2005), and first grade (La Paro, Pianta, & Cox, 2000). The extant literature offers limited guidance on whether some transitions (e.g., to kindergarten or to first grade) and types of parent involvement (e.g., school or home based) might deserve special attention in transition-to-school initiatives.

Study Questions and Hypotheses

The current prospective, longitudinal study builds on advances in the conceptualization of parent involvement by examining stability and change in different dimensions of parent involvement from pre-K to first grade in a diverse sample in an urban school district. Specifically, we investigated three questions: (a) To what extent do four dimensions of parent educational involvement—involvement at school, cognitive stimulation (teaching practice) at home, provision of learning resources at home, and variety of out-of-home learning experiences—change within and between families across the transition to elementary school? (b) Does the degree of within-family change in four dimensions of parent educational involvement predict the development of children's academic skills from the beginning of pre-K through the end of first grade? (c) Do children's initial (pre-K entry) skills in literacy, language, and mathematics interact with the degree of change in parent involvement as predictors of children's first-grade outcomes? Two periods of change in parent involvement were investigated in each of the three questions: (a) pre-K to kindergarten and (b) kindergarten to first grade.

We expected to find both between- and within-family change in parent involvement from pre-K to kindergarten and from kindergarten to first grade. We anticipated change in each of the two periods because children and, indirectly, their parents are likely to experience substantial curriculum changes in kindergarten and again in first grade relative to experiences in their prior school year. The findings of related research, particularly Dearing et al. (2006) and Son and Morrison (2010), led us to expect parent-involvement changes in both directions (less involvement, more involvement). We had no hypotheses about which dimensions of parent involvement might experience change. We expected the degree of within-family change in parent involvement to predict the development of children's literacy and language skills. This hypothesis was based on the language outcome findings of Son and Morrison and the literacy outcome findings of Dearing et al. We did not expect within-family changes in parent involvement to predict children's mathematics outcomes, because some existing research suggests that parents provide more experiences at home for the development of early reading skills than for early mathematics skills, and view school as more important for learning mathematics (for a review, see Clements & Sarama, 2009). We did not develop a hypothesis about interactions between children's initial skill levels and changes in parent involvement due to the paucity of research on this topic in the parent-involvement literature.

Method

Participants

The sample comprised approximately 90¹ children and their parents or primary caregivers recruited from public prekindergarten classrooms in a large urban school district in the Midwest as part of a national study of school readiness. Nearly all of the parents who participated in the study were the child's mother, biological (90%) or adoptive (7%). Others were grandmothers, other female relatives, or foster mothers. As reported in Table 1, more than half of the children represented racial/ethnic minority backgrounds, and about 55% of mothers had a high school diploma or less at the time their child was in pre-K.

Table 1. Participant Characteristics ($N = 90$)

Variable	Number	Percent
Child race:		
European American	40	44
African American	30	33
Other	10	11
Not reported	10	11
Child ethnicity: Latino	20	22
Not reported	<10	<22
Child gender: male	50	56
Older sibling(s) in family	50	54
Maternal education at preschool:		
Less than high school	20	22
High school diploma	30	33
Some postsecondary education	20	22
Bachelor's degree or higher	20	22
	<i>M</i>	<i>SD</i>
Child age (in months) at assessment:		
Pre-K	55.22	3.46
First grade	85.91	3.81

Note.—The unweighted sample size is rounded to the nearest 10, per Institute of Education Sciences policy regarding reports of restricted-use data.

Measures

Difference scores between measurement points (i.e., pre-K vs. kindergarten, kindergarten vs. first grade) were used as a continuous measure of the degree of change in each of four dimensions of parent involvement in children's learning. Increased involvement over time was calculated as a positive difference or change score; decreased involvement over time was represented as a negative change score. Standardized assessments were used to measure children's early reading, language, and mathematics skills. Each child measure yields standardized scores with a mean of 100 and a standard deviation of 15. The study's measures have been used widely in early childhood program research, including the Head Start Family and Child Experiences Survey (FACES) study (Zill, Sorongon, Kim, Clark, & Woolverton, 2006) and the Head Start Impact Study (Puma et al., 2010). Each of the four parent-involvement measures is based on parent report and previously used in the Head Start FACES study (O'Brien et al., 2002). The FACES study data have been analyzed by other investigators of parent involvement (e.g., Hindman & Morrison, 2011).

Parent-involvement measures.

Parental school involvement. The measure comprises the following four items pertaining to parental school involvement drawn from the parent interview schedule of the FACES study (O'Brien et al., 2002): volunteer at child's school, help with school field trip, attend a school meeting or social event, and participate in a parent-teacher conference. Parent reports of participation once or more often in each of these four activities during the school year (0 = no, 1 = yes) were summed to create a score that ranged from 0 to 4. As a check on the accuracy of parent responses, kindergarten and first-grade teachers were asked at the end of the school year to

indicate whether each of the parents with a study child enrolled in their classroom attended a school meeting or event during the school year. Teacher data secured for nearly 90 of the parents during the kindergarten year and for approximately 80 parents during first grade corroborated most parent reports about attendance at a school meeting or event (88.2% agreement in kindergarten, 92.2% agreement in first grade).

Cognitive stimulation. The measure is a composite score of nine items about parental practices to directly teach or stimulate cognitive-related skills. The items included telling the child a story; teaching letters, words, or numbers; teaching songs or music; playing counting games; playing with blocks, puzzles, or shapes; counting different things; and reading to the child. For each item except reading to the child, parents used one of three possible options to report the frequency of engaging in the activity during the past week: never (0), 1 or 2 times (1), or 3 or more times (2). Parents reported the frequency of reading to their child with four possible options: none (1), 1 or 2 times (2), 3 or more times (3), or daily (4). The total possible score range is 0 to 20. In the current study, Cronbach's alphas were .72, .79, and .75 for the pre-K, kindergarten, and first-grade years, respectively.

Home resources. The measure is the sum of 12 dichotomous items on the presence/absence of learning-focused resources at home such as magazines, books, blocks, puzzles, and shapes. The total possible score range is 0 to 12. In the current study, Cronbach's alphas were .69, .64, and .61 for the pre-K, kindergarten, and first-grade years, respectively.

Variety of out-of-home experiences. The measure is a composite score of 10 dichotomous items on whether the child participated in the past month in an out-of-home learning experience such as visiting a library, a zoo, a park or playground, an athletic or sporting event, or an activity sponsored by a faith-based organization. The range of possible total scores is 0 to 10. In the current study, Cronbach's alphas were .54, .55, and .56 for the pre-K, kindergarten, and first-grade years, respectively. This level of internal consistency, based on dichotomous data, is similar to other measures of out-of-home experiences (Bradley, 2004).

Child outcome measures.

Peabody Picture Vocabulary Test—III. The PPVT-III is a measure of children's receptive vocabulary skills, using standard American English. Children point to a picture that best represents the meaning of a spoken word. The authors reported high internal consistency reliability (.93–.95) and test-retest reliability (.91–.94) (Dunn & Dunn, 1997). Studies have established the concurrent validity of the PPVT-III (e.g., Qi, Kaiser, Milan, & Hancock, 2006) and the predictive validity of preschool PPVT-III scores for letter knowledge in kindergarten (Blair & Razza, 2007).

Woodcock-Johnson III Tests of Achievement (W-J): Letter-Word Identification. This measure of children's identification of letters and words is appropriate for children age 2 years and older. It has a test-retest reliability of .87–.96 and significant correlations with measures of literacy-related abilities (McGrew & Woodcock, 2001). Predictive validity also has been established (e.g., McClelland et al., 2007).

Woodcock-Johnson III Tests of Achievement: Applied Problems. This measure assesses children's ability to solve numerical and spatial problems presented verbally with the assistance of pictures of objects. It is appropriate for children 2 years and older, has a test-retest reliability of .85–.90, and is significantly correlated with other measures of cognitive ability (McGrew & Woodcock, 2001).

Procedures

In late spring prior to the academic year in which the study was fully implemented, we identified in the participating school district approximately 90 elementary schools with a prekindergarten classroom from which to recruit a sample of 12 schools, a target determined by available resources for the study. We omitted a small number of schools that offered a Head Start classroom due to the Head Start program's emphasis on parent involvement (Zigler & Styfco, 2010). Consent was secured for 13 pre-K classrooms from lead teachers in the 12 schools (one school had two pre-K classrooms).

At the beginning of the following academic year, all parents of children enrolled in each of the 13 classrooms were invited to participate in the study. We conducted individual assessments with approximately 140 children at the beginning of their pre-K year, using the three measures described above, and interviews with their parents at the beginning (demographic data) and end (parent-involvement measures) of the pre-K year. The sample represented an average of 10.6 children ($SD = 2.4$) per classroom. We subsequently conducted parent interviews at the end of the children's kindergarten year and individually assessed children and conducted interviews with their parents at the end of first grade on approximately 64% of the original sample. Study participants were located in 31 elementary schools in kindergarten and in 34 elementary schools in first grade. Twenty or more of the schools in kindergarten and first grade enrolled only one or two study children, and thus nesting was not an issue in analyses. Compared to the analyzed sample, the sample lost to attrition included a significantly larger percentage of children from racial minority backgrounds ($\chi^2 = 14.1, p = .001$) and children with lower initial scores (beginning of pre-K) on the PPVT ($t = 2.91, p = .004$). There were no significant differences in maternal education and children's age, ethnicity, gender, and initial scores on the Letter-Word Identification and Applied Problems measures of the Woodcock-Johnson III Tests of Achievement.

The child assessments were conducted individually at the beginning of the pre-K year and again at the end of first grade. The assessments typically entailed one session. Interviews with parents were conducted via telephone. All data were collected by graduate research assistants. Prior to each of the child data-collection points, the child assessors received 3 days of training. The lead assessor (supervisor of the child assessors) received an additional half day of training at the beginning of the study. At each of the two child data-collection points, the lead assessor periodically observed child-assessment sessions for integrity checks. Parent interviewers received 2 days of training prior to the initial interview and 1 day of refresher training prior to follow-up data collection. Fidelity of the parent interviews was regularly assessed by one of the study's investigators (N. File). There was minimal turnover among research assistants and no change in supervisors during the 3 years of the study.

Data Analyses

We investigated patterns of parent educational involvement across the pre-K to first-grade years and their association with children's developmental outcomes. Specifically, we examined stability and change in parental school involvement, cognitive stimulation, home resources, and variety of out-of-home experiences measures

across 3 years through repeated-measures ANOVA tests and correlation analyses. Second, to determine whether the degree of change in parent educational involvement predicted children's academic outcomes in spring of first grade, we ran multiple regression analyses predicting for child outcomes with degree of change in parent involvement from (a) pre-K to kindergarten and (b) kindergarten to first grade, after controlling for child skills in the fall of pre-K, concurrent parent-involvement levels, and other potential confounders. We used Cohen's (1988) guidelines to interpret effect sizes (.2 = small, .5 = medium, .8 = large).

As a measure of degree of change in parent educational involvement, we computed a difference score (change score) in each of four involvement measures across two time points by subtracting the time 1 equation from the time 2 equation. This approach reflects a simple change model (Duncan & Gibson-Davis, 2006; NICHD Early Child Care Research Network & Duncan, 2003). Positive change scores represent increases in involvement levels over time, and negative change scores represent decreases in involvement levels over time. Thus, we have two change scores—pre-K to kindergarten and kindergarten to first grade—for each of the four parent-involvement measures. This was possible because identical items were used in each of the measures across three time points. These simple change scores seem best when the nature and level of absolute score changes in a parenting measure are of interest (Son & Morrison, 2010). Because a change score is usually negatively correlated with the initial score, especially when there is a ceiling problem in a measure (Burr & Nesselroade, 1990), a change analysis needs to include the “level” measure, typically a later score or a score measured concurrently with child-outcome measures as a control to estimate the unique impact of change.

Based on prior studies, we examined the following as possible covariates: child gender (e.g., Matthews, Ponitz, & Morrison, 2009), child minority status (e.g., McLoyd, 1998), maternal education (e.g., Dearing, McCartney, Weiss, Kreider, & Simpkins, 2004), the presence of older siblings in the family (e.g., Dunn, Plomin, & Daniels, 1986), and change in school buildings (e.g., Entwisle & Alexander, 1998; Gruman, Harachi, Abbott, Catalano, & Fleming, 2008). Multiple regression analyses identified two of these variables as significant predictors of first-grade child outcomes. Specifically, racial/ethnic minority children scored lower than European American children on vocabulary (PPVT; $t = -4.01, p < .001$), and maternal education level positively predicted children's spring scores on the early reading measure (W-J Letter Word; $t = 3.74, p < .001$). Accordingly, child racial/ethnic minority status and maternal education level were included in final regression analyses as covariates. In addition to investigating main effects of degree of change in parent involvement, child \times parent-involvement change interaction terms were added in the multiple regression analysis to explore the differential impact of degree of change in parent involvement depending on children's initial skill levels.

Preliminary analyses found no significant correlations between children's initial (pre-K entry) scores and extent of change from pre-K to kindergarten and from kindergarten to first grade in the four dimensions of parent involvement. Also, preliminary analyses found low to moderate effect sizes in correlations among the four dimensions within pre-K (r 's = .02 to .30), kindergarten (r 's = .12 to .32), and first grade (r 's = .03 to .34) data points.

Table 2. Changes in Child Outcomes and Parent Educational Involvement from Pre-K to First Grade

Measures	Overall Group Mean			% Parents ≥ 1 <i>SD</i> Change			
	Pre-K	K	First Grade	Pre-K to K		K to First Grade	
				Increase	Decrease	Increase	Decrease
Parent involvement:							
School involvement (0–4)	3.21	3.18	3.03	26.0	26.0	20.9	30.2
Cognitive stimulation (0–20)	12.09	11.26	9.17	9.0	19.2	4.7	32.6
Home resources (0–12)	9.52	9.40	9.64	3.9	7.8	10.3	5.7
Variety of experience (0–10)	5.65	5.42	6.08	8.9	11.4	14.9	4.6
Child outcomes:							
Early reading	102.20	—	110.52	—	—	—	—
Early mathematics	99.04	—	106.05	—	—	—	—
Language	97.33	—	101.02	—	—	—	—

Results

Changes in Parent Involvement Across the Transition to Elementary School

The first set of analyses examined whether parents changed their levels of educational involvement during the transition to elementary school. Group means (between family) for parent participation in four dimensions of educational involvement across pre-K, kindergarten, and first-grade years are reported in Table 2 (left-side columns). Repeated-measures analysis of variance (ANOVA) was run to compare means of parent involvement at pre-K, kindergarten, and first grade. Repeated measures of parent-involvement scores were used as a within-subject factor with no other between-subject factor or covariate. Results indicated there was no significant change in parent involvement in school, $F = 1.26$, $p = .187$, or parents' provision of home resources, $F = .67$, $p = .511$. However, parents' provision of cognitive stimulation at home, on average, decreased over time, $F = 27.40$, $p < .001$, with post hoc tests showing that the level of cognitive stimulation significantly decreased from pre-K to kindergarten years, $F = 5.51$, $p < .05$, with a small effect size ($d = -.26$), and again decreased from kindergarten to first-grade years, $F = 24.92$, $p < .001$, with a medium effect size ($d = -.53$). In contrast, the level of variety of out-of-home experiences provided by parents increased overall, $F = 4.70$, $p < .01$. Although the variety of out-of-home experiences did not change significantly between pre-K and kindergarten ($d = -.10$), there was a significant increase in the variety of out-of-home experiences from kindergarten to first-grade years, $F = 4.12$, $p < .05$, with a relatively small effect size ($d = .30$). Correlation coefficients across pre-K, kindergarten, and first-grade measures were calculated as a complementary measure of stability in the level of parent educational involvement. An examination of longitudinal correlations showed some variability but demonstrated positive and significant associations over time. Specifically, autocorrelation coefficients between pre-K and kindergarten involvement measures ranged from .56 to .71, all significant at $p < .001$. Autocorrelation coefficients between kindergarten and first-grade involvement measures ranged from .53 to .56, significant at $p < .001$. The longitudinal autocorrelation coefficients were higher than the concurrent correlations across dimensions of parent educational involvement in pre-K (r 's = .03 to .22), kindergarten (r 's = .12 to .14), and first grade (r 's = $-.03$ to

.35), which suggests that there is stability in parent involvement over time along with change.

To examine changes within parents, we calculated change scores (difference scores) within individual parents by subtracting their pre-K scores from kindergarten scores for pre-K to kindergarten change, and subtracting their kindergarten scores from first-grade scores for kindergarten to first-grade change for each of the four dimensions of parent educational involvement. The distribution of change scores of educational involvement was examined and found to be relatively normal, with skewness and kurtosis statistics less than the standard error of each statistic for each of the eight change scores. This suggests that a substantial number of parents changed their educational involvement over time in a varied extent rather than a small number of parents having changed a lot.

The percentages of parents who substantially (≥ 1 SD) increased or decreased their involvement from pre-K to kindergarten or from kindergarten to first grade are reported in Table 2 (right-side columns) for each of the four dimensions of parent educational involvement. Here, parents were examined if they made a substantial increase or not and if they made a substantial decrease or not by more than 1 standard deviation. Parents who substantially increased or decreased their involvement from pre-K to kindergarten or from kindergarten to first grade tended to comprise 12% to 37% of the sample, except for the school-involvement measure, where more than half of the sample (i.e., 51%–52%) substantially changed their level of school involvement. As reported in Table 2, the percentages of parents who substantially increased versus decreased their levels of school involvement were similar during the pre-K to kindergarten years, whereas parents were more likely to decrease than increase their level of school involvement from kindergarten to first grade. Similarly, a higher percentage of parents substantially decreased their provision of cognitive stimulation from pre-K to kindergarten and from kindergarten to first grade than the percentage of parents who increased their provision of cognitive stimulation during each of these two periods. Fifty percent of parents who substantially decreased (≥ 1 SD) the provision of cognitive stimulation from pre-K to kindergarten had a concurrent increase in the level of variety of out-of-home experiences for their child. Similarly, 81% of parents who substantially decreased the provision of cognitive stimulation from kindergarten to first grade had a concurrent increase in the level of variety of out-of-home experiences for their child.

Also, as shown in Table 2, parents tended to substantially decrease rather than increase their provision of learning resources in the home during pre-K to kindergarten. However, during the kindergarten to first-grade period, more parents increased than decreased the availability of learning resources by one or more standard deviations. Finally, the percentages of parents who made a substantial increase or decrease in the variety of their child's out-of-home experiences from pre-K to kindergarten were somewhat similar, but there were more parents who increased the variety of out-of-home experiences from kindergarten to first grade.

Relation of Degree of Change in Parent Involvement to Children's Academic Outcomes

The second set of analyses examined the relation of changes (i.e., difference scores) in parent educational involvement across the transition to elementary school

to the development of children's academic outcomes. Our intent was to determine whether the degree of change in a specific dimension or dimensions of parent involvement and at a particular transition period (i.e., pre-K to kindergarten, kindergarten to first grade) was positively or negatively linked to children's language, literacy, or mathematics skills at first grade.

We ran a hierarchical regression analysis of the degree of change in which we built successive linear regression models by including control variables in the first step and then adding degree-of-change variables in the second step to predict child skills at the end of first grade. The degree of change was measured in each of the four educational involvement dimensions using two continuous change variables (i.e., pre-K to kindergarten change, and kindergarten to first-grade change). The following variables were controlled: (a) child minority status and maternal education, as indicated earlier; (b) initial child skill level measured in the fall of the pre-K year, so that every end-of-first-grade child skills measure became a "development" score of the variable; and (c) the level of educational involvement in first grade, so that we could separate the contribution of degree of change in educational involvement over time from concurrent levels of involvement.

Results showed that none of the eight change scores (pre-K to kindergarten and kindergarten to first grade in four dimensions of parent involvement) predicted pre-K to first-grade development of language or early reading skills after controlling for background variables, initial child skills, and concurrent educational involvement (see Table 3). However, the level of concurrent provision of educational resources in the home predicted early reading skills ($\beta = .23, p < .05$).

The degree of change in two parent-involvement dimensions was associated with children's mathematics skills at the end of first grade. Specifically, the degree of change in cognitive stimulation from kindergarten to first grade was positively associated with the level of children's mathematics skills at the end of first grade ($\beta = .28, p < .05$). The degree of change in variety of out-of-home experiences from pre-K to kindergarten also positively predicted mathematics skill levels ($\beta = .25, p < .05$). None of the concurrent educational involvement measures predicted children's mathematics skills at the end of first grade.

Interactions with Initial Child Skill Level

The third set of analyses examined the interaction between children's initial (pre-K entry) skill level and the degree of change in parent involvement as predictors of children's first-grade outcomes. Each of the interaction terms of child initial skills by change in parent-involvement dimensions from pre-K to kindergarten, or by change in parent-involvement dimensions from kindergarten to first grade, was entered one by one separately as the last step in multiple regression models. Results showed that most interaction terms were not significant predictors of child outcomes, with the exception of children's initial skill in mathematics by change in pre-K to kindergarten home resources ($\beta = -2.35, p < .01$). Increases in home resources from pre-K to the kindergarten year were associated with higher scores in children's first-grade mathematics skills for children with lower pre-K entry mathematics skills. However, for children with higher pre-K mathematics skills, decreases in home resources were associated with higher first-grade mathematics skills. As shown in Figure 1, we used 1 standard deviation above or below the mean of chil-

dren's pre-K entry skill score to represent children with higher or lower initial skills. To investigate the possibility that the interaction might be driven by a small number of children, we examined correlations between the degree of change in home resources and first-grade mathematics scores for subgroups of children identified by their initial mathematics scores. Results indicated that the interaction effect applied across the sample.

Summary of Major Findings

The current study analyzed change in parent educational involvement in two ways across four different dimensions of parent involvement from pre-K through first grade. First, we created categorical variables of substantial increase ($>1 SD$) or substantial decrease ($<1 SD$) in parent involvement to examine within-family changes from pre-K to kindergarten and from kindergarten to first grade. Second, we analyzed change in parent involvement over time as a continuous variable to determine whether the degree of within-family change in parent involvement during the transition to school predicted children's academic outcomes at the end of first grade. By design, the continuous measure represented increases (i.e., positive change score) as well as decreases (i.e., negative change score) in parent involvement.

Major findings may be summarized as follows. Overall, there was a significant decrease in cognitive stimulation at home from pre-K to kindergarten (small effect size) and again from kindergarten to first grade (medium effect size). The variety of out-of-home experiences provided by parents increased overall from kindergarten to first grade (small effect size). There were no changes in group means of school involvement and the provision of learning-focused resources at home across the transition to school. In contrast, analyses of within-parent variability indicated that a considerable number of parents substantially increased or decreased ($\geq 1 SD$) their level of involvement in one or more of the four dimensions of parent support of children's learning. Children's mathematics skills at the end of first grade were positively linked to the degree of change in cognitive stimulation from kindergarten to first grade and to the degree of change in the variety of out-of-home experiences from pre-K to kindergarten. Increases in the provision of learning resources at home from pre-K to kindergarten positively predicted the first-grade mathematics outcomes of children with lower initial (pre-K) mathematics skills, and negatively predicted the first-grade mathematics skills of children with higher initial mathematics skills.

Discussion

The current study contributes to an emerging line of research on parent educational involvement during the transition to school. Although prior studies indicate that children's school achievement trajectories are linked to parenting practices and the development of academic skills during the early years of schooling, there is limited empirical understanding of (a) whether and how parents change in the support of their children's learning during a period of substantial shifts in curriculum expectations, and (b) whether the degree of change in different dimensions of parent involvement predicts children's academic outcomes at the end of first grade. Distinctive features of the current study include (a) attention to different dimensions of

Table 3. Summary of Hierarchical Regression Analysis for the Impact of Changes in Parent Educational Involvement on Children's First-Grade Outcomes

Variable	Early Reading (WJ ^a Letter-Word Identification)			Early Mathematics (WJ ^a Applied Problems)			Vocabulary (PPVT-III ^b)		
	B	SE B	β	B	SE B	β	B	SE B	β
School involvement change:									
Step 1:									
Initial skill level	.339	.076	.441***	.464	.094	.547***	.518	.088	.567***
Maternal education	2.657	1.380	.213*	.555	1.481	.043	1.590	1.100	.130
Child minority status	5.894	2.706	.232*	1.308	3.077	.049	-4.040	2.540	-.162
School involvement in grade 1	3.096	1.318	.245*	.214	1.428	.016	1.482	1.075	.120
R ²	.346***			.298***			.555***		
Step 2:									
Initial skill level	.344	.078	.448***	.423	.095	.499***	.506	.090	.554***
Maternal education	2.672	1.418	.215	.128	1.479	.010	1.461	1.125	.120
Child minority status	5.998	2.777	.236*	-.029	3.115	-.001	-4.426	2.624	-.178
School involvement in grade 1	2.806	1.790	.222	-1.398	1.895	-.106	.654	1.474	.053
Pre-K to K change in school involvement	-.196	1.414	-.017	2.989	1.531	.248~	.832	1.152	.074
K to 1 change in school involvement	.527	1.764	.044	2.028	1.871	.163	1.128	1.425	.097
ΔR ²	.002			.038			.005		

Cognitive stimulation change:									
Step 1:									
Initial skill level	.312	.079	.412***	.482	.098	.586***	.487	.093	.533***
Maternal education	3.165	1.401	.259 *	.600	1.427	.047	1.825	.082	.154
Child minority status	5.473	2.834	.216	1.391	3.049	.052	-4.804	2.536	-.196
Cognitive stimulation in grade 1	-.074	.356	-.022	.252	.393	.071	.007	.289	.002
R ²	.280***			.309***			.523***		
Step 2:									
Initial skill level	.315	.080	.416***	.483	.096	.588***	.493	.095	.540***
Maternal education	3.318	1.454	.272 *	.109	1.446	.008	1.760	1.122	.149
Child minority status	5.459	2.872	.215	1.326	3.001	.050	-4.770	2.560	-.194
Cognitive stimulation in grade 1	.031	.456	.009	-.326	.476	-.092	-.168	.365	-.052
Pre-K to K change in cognitive stimulation	.023	.493	.006	.599	.493	.140	.342	.389	.087
K to 1 change in cognitive stimulation	-.194	.480	-.057	.991	.479	.279 *	.292	.375	.089
ΔR ²		.003		.042				.007	
Home resources change:									
Step 1:									
Initial skill level	.319	.078	.416***	.495	.095	.578***	.488	.088	.538***
Maternal education	2.996	1.388	.241 *	.708	1.453	.054	2.030	1.091	.166
Child minority status	4.932	2.764	.193	1.643	3.065	.061	-5.108	2.534	-.204 *
Home resources in grade 1	1.199	.678	.181	.020	.713	.003	.076	.541	.012
R ²	.315***			.328***			.550***		
Step 2:									
Initial skill level	.332	.080	.420***	.490	.095	.572***	.478	.089	.527***
Maternal education	2.561	1.440	.206	.208	1.493	.016	1.741	1.126	.142
Child minority status	5.231	2.786	.205	1.917	3.069	.071	-5.086	2.557	-.203
Home resources in grade 1	1.530	.762	.231 *	.333	.794	.048	.191	.604	.029
Pre-K to K change in home resources	-1.055	.956	-.132	-1.509	.992	-.179	-1.068	.759	-.136
K to 1 change in home resources	-.956	.937	-.134	-.961	.964	-.127	-.389	.740	-.055
ΔR ²		.015		.023			.013		

(continued)

Table 3. (Continued)

Variable	Early Reading (WJ ^a Letter-Word Identification)			Early Mathematics (WJ ^a Applied Problems)			Vocabulary (PPVT-III ^b)		
	B	SE B	β	B	SE B	β	B	SE B	β
Variety of experiences change:									
Step 1:									
Initial skill level	.313	.079	.413***	.461	.093	.559***	.484	.090	.534***
Maternal education	3.086	1.449	.252*	.454	1.499	.035	1.974	1.115	.165
Child minority status	4.882	2.876	.193	1.127	3.074	.042	-4.677	2.531	-.189
Variety of experiences in grade 1	.270	.663	.044	.131	.693	.020	-.221	.527	-.037
R ²	.278***			.305***			.538***		
Step 2:									
Initial skill level	.305	.081	.401***	.465	.091	.564***	.491	.094	.543***
Maternal education	3.246	1.503	.265*	1.157	1.489	.090	1.869	1.160	.156
Child minority status	5.030	2.917	.199	1.670	3.005	.063	-4.598	2.554	-.186
Variety of experiences in grade 1	.474	.778	.077	-.014	.785	-.002	.111	.618	.018
Pre-K to K change in variety of experiences	.017	.827	.003	1.645	.823	.248*	-.549	.664	-.089
K to 1 change in variety of experiences	-.534	.932	-.083	.137	.922	.020	-.726	.723	-.116
ΔR ²	.006			.054~			.007		

^aWoodcock-Johnson III Tests of Achievement.

^bPeabody Picture Vocabulary Test-III.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

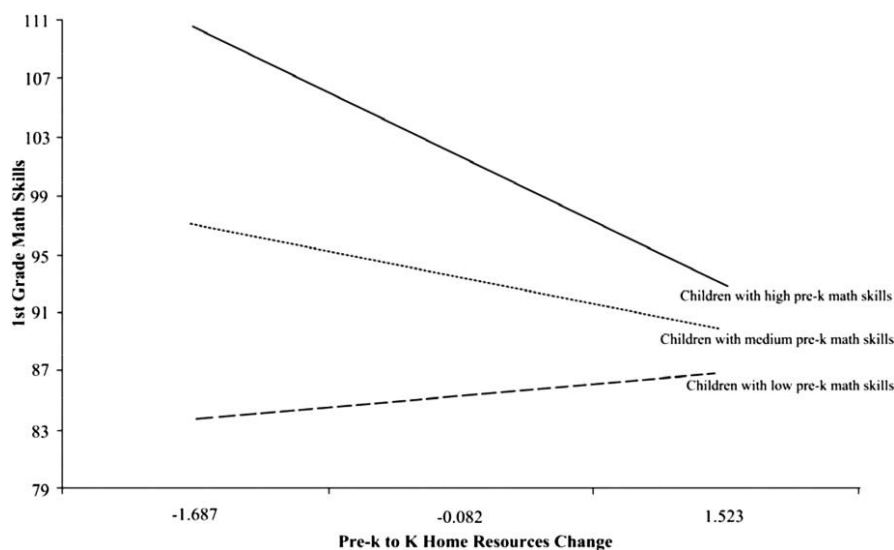


Figure 1. Child \times home resources change interaction effect on first-grade mathematics skills. X-axis represents degree of change in home resources from pre-K to kindergarten years, of which positive values indicate increases in home resources scores and negative values indicate decreases. The three lines represent relations between degree of change in pre-K and kindergarten home resources and children's mathematics skills at the end of first grade for children with (1) high initial mathematics skills (initial skills mean + 1 *SD*), (2) medium initial mathematics skills (initial skills mean), and (3) low initial mathematics skills (initial skills mean - 1 *SD*).

parent involvement, (b) a conceptualization of parent educational involvement as a dynamic process, (c) consideration of the degree of change in parent involvement within time spans that are aligned with shifts in grade level, (d) examination of whether the child outcomes predicted by the degree of change in parent involvement interacted with children's initial skill levels, and (e) a 3-year longitudinal sample of parents and their children beginning in public school pre-K, a rapidly growing segment of early childhood education.

Our findings support the conceptualization of parent involvement as a dynamic variable and, further, point to the merits of examining within-family change in parent involvement. Particularly striking is our finding that slightly more than half of parents increased or decreased their level of school involvement by one or more standard deviations from pre-K to kindergarten and from kindergarten to first grade, whereas results of the group means analyses showed no significant change in school involvement in each of these two time spans. This highlights the limitation of examining group means exclusively in investigations of change over time. The merits of approaching parent involvement as a dynamic construct are further underscored by our finding that the degree of within-family change in several dimensions of parent involvement, but not concurrent parent involvement, was predictive of children's mathematics outcomes in first grade. Thus, variables that capture more than one data point in the trajectory of parent educational involvement offer a promising predictor of children's academic progress during the transition to school. Our within-parent finding that similar percentages of parents increased or decreased their level of school involvement in each of two time spans (pre-K to kindergarten

and kindergarten to first grade) is consistent with the Dearing et al. (2006) finding regarding kindergarten to fifth grade.

Our findings also point to benefits of examining change across different dimensions of parent involvement in relation to children's academic outcomes. The degree of change in two home-based forms of parent involvement but not school involvement positively predicted children's mathematics skills at the end of first grade. This pattern is consistent with Fantuzzo et al.'s (2004) finding that home-based parent involvement was more strongly linked to preschool children's outcomes than parent involvement at school. The current study's finding that the degree of change in parents' provision of cognitive stimulation from kindergarten to first grade positively predicted children's first-grade mathematics outcomes is conceptually consistent with results of other studies regarding the importance of learning stimulation at home (e.g., Bradley, Corwyn, Burchinal, et al., 2001; Melhuish et al., 2008). Our study appears to be among the first to identify a link between degree of change in out-of-home experiences and children's academic outcomes. As noted earlier, there is theoretical support for the contribution of children's out-of-home experiences to children's development (e.g., Bronfenbrenner & Morris, 2006), but most research on this variable has been descriptive (Bradley, 2002). We note that some of the activities included in our measure of out-of-home experiences pertain to informal opportunities for children to focus on counting and numbers (e.g., sports).

Although the extant literature generally points to the contribution of learning resources at home to children's academic outcomes (e.g., Kalil & DeLeire, 2004), we did not find a main effect for learning materials at home. Rather, our results suggest that the impact of change in learning resources at home on first-grade mathematics skills interacted with children's initial (pre-K) mathematics skills. It appears that increases in learning materials at home were beneficial for children who entered pre-K with lower mathematics skills but, in contrast, were not helpful to children who entered pre-K with higher mathematics skills. The interaction effect suggests that the increased availability of items such as board games (e.g., Ramani & Siegler, 2008) was particularly beneficial to children with limited pre-K mathematics skills, but increases in learning resources at home perhaps were not well matched to the interests or needs of children with stronger pre-K mathematics skills. We wonder whether children with higher pre-K mathematics skills were insufficiently challenged by increases in the availability of learning resources at home. The interaction effect also means that decreases in learning materials at home were negatively associated with first-grade mathematics skills for children who had lower pre-K mathematics skills, but were positively associated with first-grade mathematics skills for children who had higher pre-K mathematics skills. These patterns suggest that there may be a threshold factor in the impact of changes in learning materials at home on children's first-grade mathematics skills wherein the benefit of increases in the availability of learning resources at home from pre-K to kindergarten depends on children's pre-K mathematics skill levels. This speculative idea warrants careful attention in future research, especially because the practice among schools and other agencies of providing learning materials for children's use at home presumably is based on the assumption that increased availability of learning resources at home has a universally positive effect on children.

An important question about the current results is why the degree of change in parent involvement over time predicted children's mathematics skills but not early

reading and language skills at the end of first grade. These findings were contrary to our hypotheses. In view of our results, we speculate that home-based improvements in educational supports for mathematics skills may be novel (Tudge & Doucet, 2004) and therefore a potentially more salient influence than supports for early reading and language skills. As noted earlier, parents give greater attention to literacy development than to mathematics skills. This pattern may be mirrored in classrooms, too, although we lack data on the content focus of children's school experiences. Parent actions that explicitly or implicitly change support for the development of mathematics skills at home may be a potent educational influence because attention to mathematics skills is unique relative to supports for early reading and language skills.

Another possible explanation for the current child-outcomes findings pertains to the research method. Specifically, our measures may have been insufficiently focused on parenting practices found to be predictive of literacy and language outcomes in other investigations. For example, the frequency of reading to children in early childhood, which other research has demonstrated is a strong predictor of children's later reading ability (Sénéchal & LeFevre, 2002), was one of nine items in our cognitive-stimulation measure. Six of the nine items comprising our measure of cognitive stimulation pertained to mathematics skills. In addition, our inclusion of children's initial skills (beginning of pre-K) in analyses may have functioned as a control for parenting contributions to literacy and language development prior to pre-K entry. A robust empirical literature demonstrates significant associations between parenting practices in the early years of a child's life and later literacy and language outcomes (e.g., Hart & Risley, 1995). Perhaps parenting practices prior to pre-K entry are more significant than changes in parenting practices from pre-K to kindergarten or kindergarten to first grade in promoting children's literacy and language competence. This speculation is consistent with Bradley, Corwyn, Burchinal, et al.'s (2001) finding that home-based learning stimulation had a stronger link to children's vocabulary skills in younger versus older children.

Our interpretation of differential impacts of the extent of change in parent involvement highlights the potential merits of examining domain-specific parenting practices and child outcomes. In addition to measuring different dimensions of parent involvement, there may be substantial benefit in assessing parenting practices that are directly aligned with the content of particular developmental domains (e.g., early reading skill). Further, consideration of pertinent child characteristics (e.g., skill level) in investigations of domain-specific parenting practices and child outcomes may advance our understanding of conditions under which increases or decreases in particular dimensions of parent involvement are beneficial.

A key related task of future research is to identify factors associated with changes in parent involvement, particularly in the context of shifts in school curriculum and children's age-appropriate activities. For example, we wonder whether decreases in parents' provision of cognitive stimulation at home were related to parents' views of their own teaching of their child to be a less pressing task in kindergarten and first grade because school attention to core academic skills presumably intensifies. Perhaps increases in parent participation in children's out-of-home experiences reflect the availability of extracurricular activities and expectations about the contributions of these activities to children's development (e.g., participation in sports fosters teamwork). In addition, our finding that sizable percentages of parents who decreased the provision of cognitive stimulation at home concurrently increased their

participation in children's out-of-home experiences suggests that the time available for parent-child activities (in or out of home) is a finite resource that involves trade-offs in how parents and their children use shared periods of time. The finding that similar percentages of parents increased or decreased their level of school involvement over time underscores the need for research on predictors of change in parent participation in school activities.

Limitations

The correlational design of our longitudinal study prevents claims about causal relations. We compared parent-involvement levels across two time spans of approximately 12 months each but did not measure within-year stability and change in parent involvement. Parents' reports of participation in their child's learning may not accurately represent their involvement, although we found a high level of teacher corroboration of school involvement in kindergarten and first grade. Observational measures of parenting practices at home may provide more reliable data than self-report. An additional qualification is the low internal consistency of the variety of out-of-home experiences measure. Although the measure's alpha met a minimum acceptable level (.50, Cohen & Cohen, 1983), it may be problematic to assume that parents involve their children in different types of out-of-home activities with similar levels of frequency (Bradley, 2004).

The sample was not randomly selected at the school, teacher, or parent level, and thus study participants may have had a special interest in parent educational involvement. Differential attrition from the study's sample across the 3 years of data collection also limits the ability to generalize our findings to urban school populations. Because prior research has identified significant racial/ethnic differences in the quality of home environments (e.g., Bradley, Corwyn, McAdoo, & Coll, 2001), we may have found a different set of results without the loss of racial minority families from our longitudinal sample. The relatively small sample size restricted the power of our analyses.

Implications

The design of initiatives aimed at facilitating child and family transition to school may be improved by recognizing the possibility of change in parent involvement across the initial years of schooling. Supports for parent involvement may need to transcend a focus on the initial connection to a school because patterns of participation are not necessarily stable over time. Transition-to-school policies and programs that are focused primarily or exclusively on adaptation to pre-K or kindergarten may miss important opportunities to promote a positive transition to first grade. For example, of the two periods of change examined in the current study, the degree of change in parents' provision of cognitive stimulation from kindergarten to first grade was most strongly linked to the development of children's mathematics competence. It also may be appropriate for policies and practices focused on parent educational involvement to recognize the multidimensionality of parent participation in their children's learning. Higher levels of participation in parents' school involvement, which is a goal of many transition-to-school initiatives, may not lead to higher levels of engagement in other forms of support for children's learning. Results

of the current study underscore the importance of parents' home-based involvement, particularly provisions for cognitive stimulation and out-of-home learning experiences, for children's mathematics skills. It may prove beneficial for efforts aimed at promoting parent involvement at home to emphasize parental teaching practices that are substantively aligned with specific child outcomes. For example, a school that seeks to engender parent support for increasing students' mathematics skills may be better served by emphasizing particular mathematics-related practices (e.g., parent-child engagement of number board games) versus a broad set of messages about parent involvement at home, especially for children with higher initial skills in mathematics. In sum, results of the current study point to the promise of policies and practices that embrace a broad view of the transition to school characterized by changes in different dimensions of parent involvement from pre-K through first grade.

Notes

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1. The sample size for this study is rounded to the nearest ten, per Institute of Education Sciences policy regarding reports of analyses of restricted-use data.

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