

The Parents as Teachers Program and School Success: A Replication and Extension

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Abstract This study is a replication and extension of an earlier study, using a larger sample, a better measure of poverty status, and new longitudinal data. The study used path analysis to test hypothesized models of how the Parents as Teachers (PAT) program affects children's school readiness and subsequent third-grade achievement. Participants were 5,721 kindergarten children who were chosen to be representative of all children beginning public school in the state of Missouri in the fall of 1998–2000. These children were subsequently located in the state's third-grade test database 4–5 years later (82% of the original kindergarten sample). The causal models, which postulated both direct and indirect effects of PAT, were strongly supported by the data. *Editors' Strategic Implications:* The findings add to the evidence that the PAT home visiting program holds promise as a primary prevention program. The authors demonstrate how parenting practices (including reading to children and enrolling them in preschool) promote both school readiness and subsequent academic achievement, but they also remind us of the pervasive effects of poverty.

Keywords Achievement · Intervention · Home-visiting · School readiness

With few exceptions, (Harris 1998; Rowe 1994; Scarr 1992) a consensus has been reached that parents play a central role in the development of their children (Bornstein 1995; Collins et al. 2000; Maccoby 2000; O'Connor 2002; Rutter 2002, 2005; Shonkoff and Phillips 2000; Zigler and Styfco 2006). A view held by scholars

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and laymen alike is that better parenting results in children's better behavior. Thus, beginning with Levenstein and Levenstein's Parent–Child Home program (2008) and Head Start's Home Start program (now called the Home-Based program services), a number of home visiting programs have been mounted. Descriptions and recent comprehensive reviews of these various programs, which currently reach over 400,000 children and families annually, may be found in Gomby (2005) and Brooks-Gunn and Markman (2005).

A wide variety of home visiting programs exists, some of which serve large numbers of families. The programs may be divided into two types. One type has as its goal changing the behavior of the parent (e.g., in order to reduce the incidence of child neglect and abuse). The goal in other home visiting programs, such as Levenstein's Parent–Child Home program and Head Start's Home-Based program, is to improve the functioning of the child by educating parents. In such programs, parents are helped to engage in improved socialization practices known to be conducive to the child's development.

There is agreement (Brooks-Gunn and Markman 2005, Gomby 2005) that two-generation programs that involve working simultaneously with the parent and the child (e.g. Head Start, the Perry Preschool, and the Chicago Child-Parent program) result in improved functioning of the child. Whether working with parents alone results in improved child behavior remains a divisive issue. Leading scholars (Brooks-Gunn 2003; Brooks-Gunn and Markman 2005; Duncan and Magnuson 2006; St. Pierre and Layzer 1998) have asserted that parent-focused home visiting programs have no positive effects on children. For example, Brooks-Gunn and Markman (2005) argued that the positive parenting effects found for home-based programs "could not be translated into child effects" (p. 153). One child outcome that is of particular current interest is school readiness (Pfannenstiel et al. 2002; Zigler et al. 2006), which was Goal One of the Goals 2000 Educate America Act. In regard to this outcome, Brooks-Gunn and Markman (2005), relying on the analysis done by St. Pierre and Layzer (1998), conclude that home visiting programs are unlikely "to enhance school readiness" (p. 153). However, in the most comprehensive and thoughtful review of home visiting done to date, Gomby (2005) concludes that when done well, "home visiting services... can benefit parents and children" (p. 49). Throughout her review, she emphasizes that the positive effects on children will be relatively small and that workers should "keep their expectations modest" (p. 48).

In view of the conflicting evidence and the soundness of the theoretical underpinnings of home visiting models, Zigler and Styfco (2006) have defended the value of home visiting and have called for new empirical data in order to resolve the issue of whether home visiting programs directly benefit children. The present study provides such further evidence and attempts particularly to resolve the issue of whether a home visiting program can result in children's improved school readiness.

The particular home visiting program examined in this study was Parents as Teachers (PAT). This program is now provided at school sites throughout the state of Missouri and in some 2,300 other sites throughout the nation and the world. Further, other home visiting programs use the parent training curriculum of PAT, Born to Learn, which was constructed by PAT in collaboration with neuroscientists

at Washington University. Described in more detail below, PAT entails home visits by parent educators who teach principles of child development, model appropriate activities, and facilitate access to social and supportive services. Child development screenings and observations are also provided. Families may enroll from the prenatal period until the child's third birthday. Some parents choose to remain in the program until the child's fifth birthday. Employing quasi-experimental studies, evidence was found some years ago (Pfannenstiel and Seltzer 1989; Pfannenstiel et al. 1991, 1996) that PAT did improve the school readiness of children in participating families.

This positive effect on children's school readiness was recently re-affirmed by Pfannenstiel et al. (2002). These investigators postulated and confirmed a causal model predicting both direct and indirect effects of the PAT program on children's school readiness. Parents in the PAT program were found to read to their children more often and to be more likely to enroll them in preschool, both of which were found to increase school readiness. Evidence was also found for direct effects of PAT upon school readiness, suggesting that the parents' child-rearing practices were changed in other beneficial ways not formally examined. Though not examined in the model, given the nature of the PAT curriculum, good causal candidates for further investigation would be parents displaying greater sensitivity and nurturance to their children and engaging in less punitive discipline (one of the findings in the evaluation of the Early Head Start home visiting model). In terms of the absolute level of school readiness displayed by children in poverty schools, the overall impact of receiving the PAT program was noteworthy. Children in poverty schools who had received both the PAT program and a follow-up educational preschool program displayed equivalent school readiness scores to nonpoverty children who had been reared at home and did not receive a preschool program. Contrary to Olds's (2006) view that home visiting should be limited to children of the poor, the school readiness scores of nonpoverty children were also enhanced if their families participated in the PAT program.

The present study represents both a replication and an extension of the Pfannenstiel et al. (2002) study. Further, the present study corrects a weakness in the Pfannenstiel et al. study. The earlier study employed the child's attendance in a poverty neighborhood school as an indicator of poverty rather than an indicator of the child's own poverty status (eligibility for free or reduced cost lunch). The earlier study also employed school readiness as the ultimate dependent variable. The present study employed three cohorts of children and, in addition to school readiness, examined their third-grade performance. Our expectation was to replicate the earlier Pfannenstiel et al. (2002) findings using a better measure of the child's poverty status. In regard to third-grade performance, scholars' (Alexander and Entwisle 1988; Zigler et al. 2006) views of the importance of school readiness in predicting later school performance generated the expectation that greater school readiness would be associated with greater third-grade performance. Finally, since the improved socialization practices resulting from PAT participation are found to lead to improved school readiness, these same practices in the home should result in better third-grade performance as well. Thus, both PAT participation and the child's better school readiness should have positive effects on third- grade performance.

Methods

Description of the PAT Program

The PAT program was founded on the belief that parents are their child's first and most influential teacher. Universal access is a core value: all parents deserve support in their parenting role and should have the choice to participate in supportive services if they wish. The staff forges partnerships with parents by identifying parental strengths and building upon them. Staff members individualize the programs to each family's circumstances, identify potential problems in child development, and offer help as early as possible. Local programs adapt the PAT model to fit the community and population served.

Home visitation is the heart of the PAT program. Visits are scheduled monthly, bi-weekly, or weekly according to family preference and need, and they may begin before the child is born. PAT-certified parent educators, trained in child development and home visiting, help parents learn appropriate expectations for each stage of their child's development. They model and involve parents in activities with their children that encourage learning and promote strong parent-child relationships. Book sharing is part of every visit. The revised curriculum, *Born to Learn* (Parents as Teachers National Center 1999) was developed collaboratively with neuroscientists at Washington University in St. Louis and incorporates the latest knowledge concerning early brain development.

PAT staff also schedule parent group meetings to provide additional input from the staff or outside speakers, to allow parents to share successes and common concerns about their children's behavior, and to help parents build support networks. Meetings are sometimes combined with social events. Many programs offer drop-in and play times to provide families with the opportunity to use the PAT center's facilities with their children, visit with other parents, and talk informally with the parent educator.

Annual health, hearing, vision, and developmental screenings, beginning in the first year, are a third component of the PAT program. Parents are taught to observe and monitor their child's development on an ongoing basis. Screening and regular observation are intended to detect delays or learning difficulties early in the child's life so that corrective actions can be taken. Finally, a resource and referral network is an integral part of the PAT program. PAT programs establish ongoing relationships with other institutions and organizations that serve families. Parent educators help families identify needs, connect with appropriate resources, and overcome barriers to accessing services. Referrals to pediatricians and child diagnostic or therapy programs that are indicated as a result of screening are examples of this service.

Procedure

The study was conducted as part of the Missouri School Assessment Project, a statewide initiative designed to gather information about the school readiness of children entering kindergarten, their preschool experiences, and their access to health

care. In the fall of 1998, the Missouri Department of Elementary and Secondary Education (DESE) randomly selected 10 percent of the public elementary schools in Missouri, stratified on location (urban, medium-size town, or rural) and school poverty. Schools in the metropolitan Kansas City School District did not participate due to major district changes occurring that year. Administrators of all other invited schools agreed to participate. In the fall of 1999 and of 2000, the Missouri DESE repeated the selection, again stratifying on location and school poverty. For budgetary reasons, 5% of schools were selected in 1999, whereas 10% of schools were selected in 2000. Selection was made independently in each year, so that some schools participated more than once. In 1999 and 2000, administrators of all invited schools agreed to participate.

Kindergarten teachers attended a 1-day training session on working with parents and guardians to collect preschool and health care information. The training session also covered observation-based techniques to assess children's skills, knowledge, and social development. Teachers completed a School Entry Profile (described below) for each student. Teachers gave a Parent/Guardian Survey to parents, who were asked to provide information about their children. Teachers were asked to use their judgment during the fall parent conference, either allowing the parent to complete the form while waiting for the conference or offering assistance as part of the conference.

In the springs of 2002–2005 the statewide third-grade achievement test database was searched for the names of the original kindergarten students. Seventy-six percent of the students were located as having taken the state assessment in Communication Arts in the expected year and an additional 6% were located as having taken the assessment a year later than expected on the basis of their year of entry into kindergarten.

Participants

A combined sample of 7,710 children entered kindergarten in the 1998–1999, 1999–2000, and 2000–2001 school years and were in Missouri public schools and tested on the third-grade state assessment 4 or 5 years later (82% of the original kindergarten sample). Complete parent interview data were available for almost 86% (6,606) of these children. These data revealed that 782 had been identified as special needs students during their preschool years. As was true in the earlier study (Pfannenstiel et al. 2002) these participants were excluded from the analyses of the PAT effects in the present study, because the PAT program is not designed to meet the full needs of special education students. Some children ($N = 103$) had only partial data on the kindergarten school readiness measure or the third-grade achievement test and were also excluded. The participants for the third-grade analyses were thus $N = 5,721$ children for whom complete information existed and who had not been identified as having special needs prior to entering kindergarten. Fifteen percent of the sample identified themselves as a racial or ethnic minority. Based on eligibility for free or reduced cost lunches, 45% were classified as being poverty-level students.

Measures

An expert panel of early childhood educators and specialists developed the School Entry Profile as a revision of a previous instrument, the Student Observation Record (Pffannenstiel 1997). The Profile consists of 65 items reflecting areas of performance and skills appropriate to kindergarten entry and observable within the first 6–8 weeks of school. Seven areas were assessed. Items measuring (1) symbolic development, (2) communication, (3) working with others, (4) mathematical/physical knowledge, and (5) learning to learn were rated on a 3-point scale: almost always, occasionally/sometimes, and not yet/almost never. Items comprising the (6) physical development and (7) conventional knowledge domains were scored yes or no. To maintain consistency, teachers were asked to focus on one domain at a time, rating all children in their class on those items before proceeding to the next domain. Because of high intercorrelations among the seven scales (see Table 1), they were summed to form an overall school readiness score. This score had high reliability as assessed by Cronbach's alpha ($\alpha = .98$).

The Parent/Guardian Survey consisted of questions about health issues, preschool attendance, and home literacy activities. For health issues, parents indicated whether their child was covered by health insurance or Medicaid, had received a health screening and been immunized by age 2, and had access to medical care from birth to school entry. Parents reported whether, and for how long, children had participated in a number of preschool experiences: Parents as Teachers (PAT), First Steps, early childhood special education, Early Head Start, Head Start, public preschool, private preschool, center-based child care, child care in own home, child care in other private home, or remained at home with parent. Parents also indicated whether preschool and childcare experiences were in licensed or accredited facilities. Finally, parents reported on how often someone in the home read to the child.

The Missouri Assessment Program (MAP) Communication Arts Assessment was developed in 1996–1998 by the State of Missouri in collaboration with the statewide assessment contractor, CTB/McGraw-Hill. The test has been mandatory throughout the state since the spring of 1999. The MAP assessment used for the years of the present study (some changes were made following enactment of the No Child Left

Table 1 Correlations among the seven scales of the school readiness measure ($N = 5,721$)

	Mean	SD	1	2	3	4	5	6	7
1. Total scale score	126.8	26.2	(.98) ^a						
2. Symbolic representation	17.3	3.7	.81	(.91)					
3. Communication	40.5	9.9	.95	.71	(.95)				
4. Mathematical/physical knowledge	23.3	6.0	.91	.67	.85	(.95)			
5. Working with others	16.9	3.8	.83	.67	.71	.65	(.90)		
6. Learning to learn	22.3	4.6	.88	.68	.77	.73	.82	(.92)	
7. Conventional knowledge	6.5	1.6	.69	.45	.65	.65	.48	.56	(.77)

Note: ^a Coefficient alpha standardized reliability estimate for scales are reported in parentheses

Behind statute) included 47 selected-response items, 8 constructed-response items, and one writing prompt. The contractor scored the majority of responses electronically, while some constructed-response items and writing-sample responses were scored by Missouri teachers as part of a staff development program. All correct responses and points earned were used by CTB/McGraw-Hill to derive the MAP scale score used in this study.

Results

Prediction of School Readiness

Pfannenstiel et al. (2002) reported predictors of school readiness for the first cohort, using an estimate of student poverty based on school-wide characteristics. In the present study, we re-examined the question of whether PAT participation led to higher school readiness in three stages. First, we examined the consequences of using improved measures of poverty by comparing the original first cohort results with results for the same cohort using individual-level poverty estimates. Next, we compared the revised first-cohort results with results for the combined second and third cohorts to determine whether the findings for the first year could be replicated in a different, independent, sample. Finally, we pooled all three cohorts from the present study to form a sample whose results we compared with the original findings of Pfannenstiel et al. (2002).

In each case, we again performed a path analysis with manifest variables to determine whether the data supported a hypothesized theoretical model with both indirect and direct effects of PAT upon school readiness. A first expected indirect path was through increasing the likelihood that parents would read to their children at home. A second indirect path was through increasing the likelihood that parents would choose to enroll their children in educational preschool programs. Finally, we hypothesized that PAT participation would directly affect school readiness by changing parents in ways that were not measured in this study. Figure 1 shows the causal model that we tested.

All models tested in this study were estimated using the Statistical Analysis System (SAS) CALIS procedure for structural equation models. Structural analysis of the variance–covariance matrix used maximum likelihood estimation. Goodness of fit of the model was assessed through multiple means, including the examination of residuals, chi-square probability values, and several fit indexes, including Bentler and Bonnett’s normed fit index (NFI) and nonnormed fit index (NNFI), Bentler’s comparative fit index (CFI) and the Root Mean Square Error of Approximation (RMSEA).

The causal model was strongly supported by the data in the results for all analyses. Due to the similarities of all analyses, we report detailed results only for the final analysis for the pooled three-cohort sample. As was found for the first cohort alone, controlling for all other variables in the model, both demographic characteristics of the children and their prekindergarten experiences were significant predictors of children’s school readiness. Figure 2 shows the results.

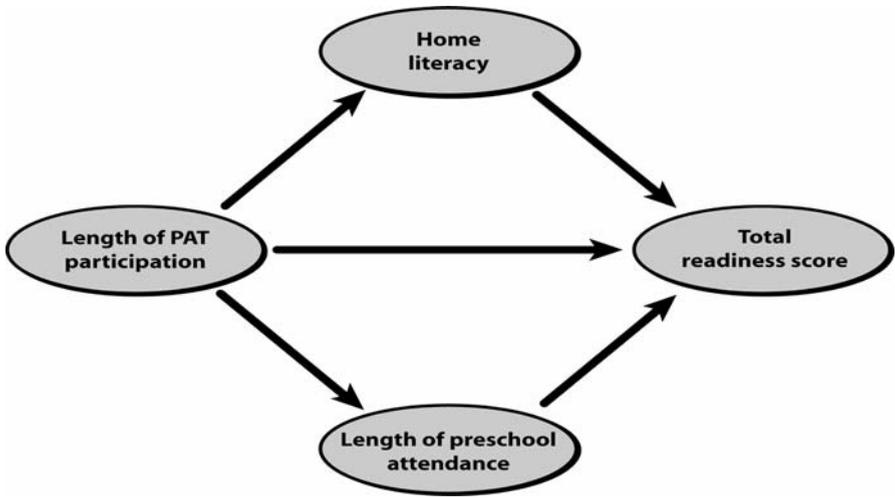


Fig. 1 Hypothesized structural model of direct and indirect effects of length of PAT participation upon school readiness

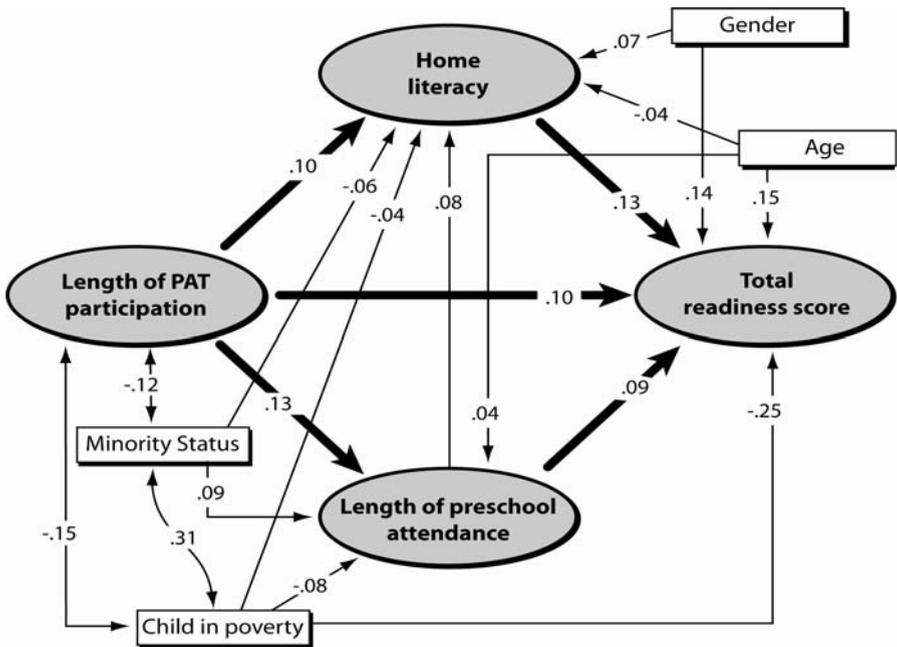


Fig. 2 Structural model of direct and indirect effects of length of PAT participation upon school readiness

As can be seen in Fig. 2, as hypothesized, parents in the PAT program read to their children more often and were more likely to enroll them in preschool, both of which increased school readiness. Evidence was also found for direct effects of PAT

on school readiness. The magnitudes of the path coefficients for the direct and indirect effects of PAT participation to school readiness are almost identical to those in the prior study. The total effect size for the sum of direct and indirect PAT effects was .12 (Alwin and Hauser 1975). As previously found, the demographic variables of age, gender, and poverty directly predicted school readiness, with a substantially larger path coefficient for poverty (−.25 instead of −.06). Unlike the results for the first cohort alone, minority status was no longer a direct predictor of school readiness. Thus the effect of having a better measure of poverty was to strengthen the predictive importance of poverty in the model and to reduce the importance of minority group membership.

All assessments of the fit of the data to the hypothesized direct and indirect effects model indicated very good to excellent fit. If the theoretical model successfully accounts for the actual causal relationships between the variables, the predicted model matrix should be nearly identical to the original covariance matrix. Examination of the values of the raw residualized matrix revealed zero or near zero residuals. None of the normalized residuals exceeded the commonly accepted criterion of 2.0.

A second test of the fit of the model is the chi-square statistic, which provides a test of the null hypothesis that the data fit the model. The nonsignificant $p = .10$ for the test allows the acceptance of the null hypothesis of good model fit. Additional fit indices provide a third test of goodness of fit. All fit indices—the NFI, the NNFI, and the CFI—yielded values of .98 or higher. Row 1 of Table 2 summarizes the results of the goodness of fit tests for the model. Finally, the RMSEA had a p value less than .01, denoting excellent model fit.

Having demonstrated good model-data fit, each hypothesized structural path was examined to determine if the coefficients were significantly different from zero using t -tests of the ratio of each path coefficient to its standard error. All hypothesized paths were significant at $p < .001$. Furthermore, all standardized path coefficients exceeded .05 in absolute value, indicating they were not trivial in size. Thus, the path analysis results for the combined 3-year sample are essentially equivalent to the results found for the first year alone with respect to the effects of the PAT program.

Table 2 Goodness of fit indices for tested school readiness models ($N = 5,721$)

Model	Chi square	df	p	NFI ^a	NNFI ^b	CFI ^c	RMSEA ^d
Direct and indirect effects	4.5	2	.10	1.00	.98	1.00	<.01
Indirect PAT effects only	68.2	3	<.0001	.97	.71	.97	.06
Eliminating PAT → reading at home	59.4	3	<.0001	.97	.75	.97	.06
Eliminating PAT → preschool	96.5	3	<.0001	.96	.59	.96	.07
Null	2160.1	28	–	–	–	–	–

Note: ^a NFI = Normed Fit Index, ^b NNFI = Non-normed Fit Index, ^c CFI = Bentler’s Comparative Fit Index, ^d RMSEA = Root Mean Square Error of Approximation

Table 3 Comparison of retained students and never-retained students on model variables

	Retained (<i>n</i> = 348)	Never retained (<i>n</i> = 5,373)	Prob.
Age at school entry	5.6	5.8	<.0001
% Male	62	48	<.0001
% Poverty	77	41	<.0001
% Minority	25	14	<.0001
Length of preschool attendance	.67 years	.83 years	<.0001
Length of PAT participation	.37 years	.60 years	<.0001
Frequency of home literacy activity	7.8	8.2	<.0001
School readiness total score mean	94	129	<.0001
School readiness total score SD	24.1	24.9	

Predictors of Third-Grade Achievement in 3-Year Sample

Consequences of Retention in Grade for the Predictive Model

About 6% of the children completed the third grade at the end of their fifth year in school, instead of at the end of their fourth year. As Table 3 shows, retained students differed significantly from nonretained students on every variable in the predictive model. As Table 3 also shows, the effect size for the difference between the retained and nonretained students on the total school readiness score was very large (Cohen's $d = 1.41$, Cohen 1977).

Because retained students were not tested until a year later than their nonretained peers, it would be misleading to use the scores they earned after an additional year's time in school. There is clearly no way to know exactly how the retained children would have scored if tested a year earlier (when they should have been third-graders but were not). However, an estimate might be made by arguing that these children are below the first percentile in achievement relative to their peers and thus are at least 3 standard deviations below the mean for their peer group. We therefore subtracted 90 points (3 times the standard deviation for the nonretained group) from the MAP scores earned by the retained students when they were tested a year later and used these reduced scores when analyzing the data for the entire group of students.

Test of Causal Model Predicting Third-Grade Achievement

The third-grade Communication Arts MAP score was added to the school readiness model to examine the sustained effects of demographic background characteristics and prekindergarten experiences on achievement at the end of the early elementary years. Table 4 presents the correlations, means, and standard deviations for all variables included in the structural equation model.

Table 4 Correlations among variables in the tested structural model ($N = 5,721$)

	Mean	SD	1	2	3	4	5	6	7	8
1. MAP achievement score	639.5	41.40								
2. Total readiness score	126.8	26.17	.49							
3. Length PAT participation	.58	.81	.15	.17						
4. Racial/ethnic minority	.15	.36	-.18	-.13	-.12					
5. Eligibility for free lunch	.43	.50	-.27	-.28	-.15	.31				
6. Gender	.49	.50	-.12	-.14	-.02	.02	.00			
7. Age	5.81	.35	.12	.15	.00	-.06	-.02	.06		
8. Length preschool participation	.82	.74	.07	.13	.13	.05	-.15	-.02	.03	
9. Frequency home literacy activity	8.17	1.43	.12	.17	.12	-.08	-.08	-.08	-.04	.09

The results of the test of the causal model are shown in Fig. 3. All paths that had predicted the School Readiness score were hypothesized to be significant and were tested for significant paths to third-grade achievement scores as well. Lagrange and Wald tests were used to identify which paths were nonsignificant predictors and should be dropped.

As Fig. 3 shows, the most important significant predictor of third-grade achievement was the measure of school readiness at kindergarten entry, with a substantial path coefficient of .42. School readiness at kindergarten entry far outweighed the demographic variables of age, gender, poverty, and minority status in predicting subsequent third-grade achievement. Among the demographic variables, poverty provided the second most important predictor of third-grade achievement demonstrated by a path coefficient of $-.12$. While poverty status continued to demonstrate deleterious effects on third-grade achievement, the

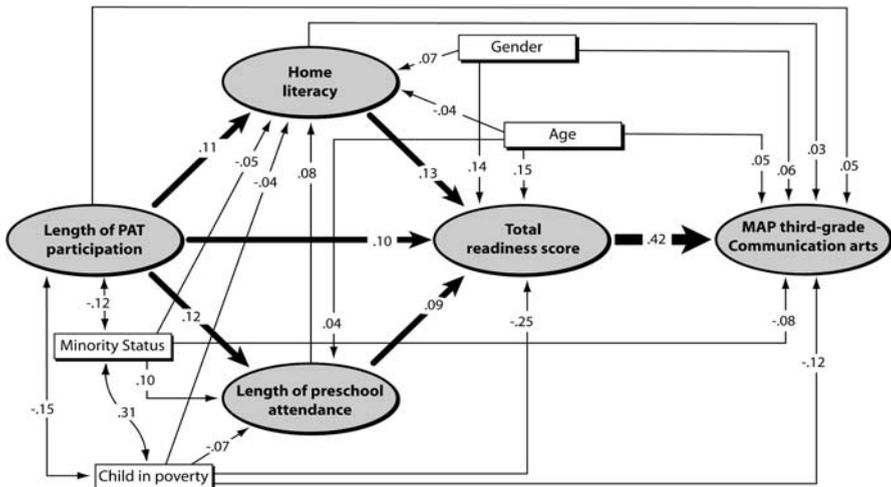


Fig. 3 Structural model of direct and indirect effects of length of PAT participation upon third-grade academic achievement

Table 5 Goodness of fit indices for school readiness and 3rd grade MAP model ($N = 5,721$)

Model	Chi square	df	<i>p</i>	NFI ^a	NNFI ^b	CFI ^c	RMSEA ^d
Direct and indirect effects	5.9	3	.12	1.00	.99	1.00	<.01
Indirect PAT effects only	21.5	4	<.001	.99	.96	1.00	<.05
Eliminating PAT → reading at home	73.8	4	<.0001	.98	.84	.98	.06
Eliminating PAT → preschool	85.0	4	<.0001	.98	.82	.98	.06
Null	4012.0	36	–	–	–	–	–

Note: ^a NFI = Normed Fit Index; ^b NNFI = Non-normed Fit Index; ^c CFI = Bentler's Comparative Fit Index; ^d RMSEA = Root Mean Square Error of Approximation

magnitude of the coefficient, and thus the importance of poverty, was significantly reduced from the magnitude at school entry. The importance of age and gender in predicting third-grade achievement was similarly reduced. While minority status did not demonstrate a significant path to school readiness, it did predict third-grade achievement, with a significant $-.08$ path coefficient.

As was true for the prediction of school readiness, length of PAT participation had significant and meaningful direct effects on third-grade achievement, as well as indirect effects through increasing school readiness, which led to better eventual school achievement. The total effect size for the sum of direct and indirect PAT effects was .11 (Alwin and Hauser 1975). The frequency of home literacy activity prior to kindergarten entry had a significant, though small, direct effect on third-grade achievement, as well as indirect effects through increasing school readiness. Although the magnitude of the direct effect was small, the model fails if the path is deleted from it. If the direct or indirect effects of PAT are eliminated, the model also fails. The model accounts for a sizable 28% of the variation on Communication Arts scores. Table 5 provides the Goodness of Fit indices for the accepted direct and indirect effects model.

Absolute Levels of School Readiness and Third-Grade Achievement

Because path analysis does not show children's absolute level of performance, the school readiness and third-grade achievement scores of children who received different kinds of preschool experiences were examined. Table 6 presents the results for school readiness.

As Table 6 shows, and as was true in the earlier study (Pfannenstiel et al. 2002), for each of the four kinds of preschool experience, impoverished children had lower school readiness scores than did nonimpoverished children. It is noteworthy that impoverished children whose parents received PAT and who also attended a preschool program attained school readiness scores that were nearly equivalent to those of nonimpoverished children who had not received any preschool enrichment (Mean = 124 vs. 127, $t [1196] = 2.08, p < .06$).

The results for third-grade achievement are shown in Table 7. As Table 7 shows, the pattern of results is similar to that for school readiness, but the gap between the impoverished and nonimpoverished children has widened such that none of the groups of impoverished children scored similarly to the nonimpoverished children.

Table 6 School readiness scores for poverty-level and non-poverty-level children

	<i>n</i>	%	Mean	<i>SD</i>
<i>Poverty-level children</i>				
Neither PAT nor preschool	650	26	113	27.3
PAT, no preschool	210	9	118	29.1
No PAT, preschool	963	39	119	28.1
PAT plus preschool	646	26	124	25.8
<i>Non-poverty-level children</i>				
Neither PAT nor preschool	552	17	127	24.1
PAT, no preschool	342	11	133	24.1
No PAT, preschool	1,210	37	132	22.8
PAT plus preschool	1,148	35	137	21.8

Discussion

The findings of this study provide further evidence of the effectiveness of the PAT home visiting program. Using independent samples from subsequent years and individual measures of poverty, the prediction of school readiness in the present study replicated the PAT effects reported in Pfanenstiel et al. (2002). The replicated model confirmed that PAT improved school readiness through a direct effect (better parenting practices) and two indirect effects—more reading to children at home and a greater likelihood of enrolling the child in a preschool program such as Early Head Start, Head Start, or public or private preschool programs. The importance of this replication is underscored by Cohen's reminder (1994) that in the natural sciences, the ultimate criterion of validity is replication.

The consequence of having a better measure of poverty was to increase the importance of poverty and decrease the importance of minority group membership in the model. The finding that social class effects are more important than minority

Table 7 Third-grade achievement scores for poverty-level and non-poverty-level children

	<i>n</i>	%	Mean	<i>SD</i>
<i>Low-SES children</i>				
Neither PAT nor preschool	650	26	621	47.9
PAT, no preschool	210	9	632	48.8
No PAT, preschool	963	39	626	46.6
PAT plus preschool	646	26	632	43.4
<i>Non low-SES children</i>				
Neither PAT nor preschool	552	17	644	33.4
PAT, no preschool	342	11	649	37.1
No PAT, preschool	1,210	37	647	34.8
PAT plus preschool	1,148	35	654	31.9

status is consistent with the results of a large study in which equal numbers of middle-class and lower-class black and white children were compared on a variety of tasks (Yando et al. 1979).

The present study's findings extend the earlier findings in demonstrating the importance of the PAT program for children's third-grade achievement. The PAT program had similar pathways in predicting school achievement as it had in predicting school readiness. For example, length of PAT attendance was both a direct and indirect (through increased school readiness) predictor of third-grade achievement. For both school readiness and third-grade achievement, home literacy and preschool attendance were important, and both were predicted by length of PAT attendance. Home literacy efforts also had a small direct effect on third-grade achievement. The importance of parental reading to children is well established (Bus et al. 1995), and the present findings lend further support to the promotion of home literacy as a program goal in intervention efforts.

The importance of enrollment in preschool programs appeared to operate primarily through its effect in improving the child's readiness for school. The finding that the most important predictor of third-grade test performance was school readiness is consistent with decades of research (reviewed by Zigler et al. 2006) indicating that school readiness predicts later school adjustment and possibly life success. The present findings provide additional confirmation of the importance of the goal of increasing school readiness.

Probably the most important finding in this study is evidence that the PAT program improved parenting practices in ways that promote both school readiness and subsequent academic achievement. The direct effect of length of PAT attendance was significant and of meaningful magnitude in both models. It is well established that positive parenting is extremely important for healthy child development (Collins et al. 2000; Maccoby 2000; O'Connor 2002; Rutter 2005). The present findings are consistent with reviews of other home visiting efforts showing that they can promote at least modest improvements in parenting practices (Bakermans-Kronenberg et al. 2003; MacLeod and Nelson 2000; Nelson et al. 2003; Sweet and Appelbaum 2004).

Some of the strongest evidence for the lasting benefits of improved parenting following intervention comes from the Turkish Early Enrichment Project (Kagitcibasi et al. 2001). Low-income mothers who were randomly assigned to receive a combined home visiting and center-based "mother training" program had children who showed gains in school achievement and socioemotional development that were sustained long past the time the intervention ended. As these authors noted, "It appears that the mother training program provides a beneficial change in the mother herself, which consequently is reflected in her relation with her child and in the general atmosphere of the home. This contextual change helps to support the continued development of the child" (p. 357).

In terms of absolute levels of performance, poor children who received both the PAT program and quality preschool education had school readiness scores that approximated those of more advantaged children. These results concur with Yoshikawa's (1994) conclusion that the combination of family support and early preschool education is a particularly effective intervention model. However, by third grade, the more affluent children were clearly superior to poor children in

third-grade achievement. This result supports the warning (Brooks-Gunn 2003; Gomby 2005) that we be realistic in our expectations. Our soundest conclusion is that while our current interventions can reduce the achievement gap between children in the two classes, they will not totally eliminate this gap (Rothstein 2004). In the present study, the benefits accruing from a 5-year intervention, beginning with a 3-year home visiting program, followed by 2 years of educational preschool, cannot totally offset the negative consequences of growing up in impoverished homes and experiencing the multiple risk factors encountered in such environments. Also, the typical middle-class family provides a level of enrichment (e.g., field trips, internet access, reading materials, and educational games) that is not matched in impoverished homes regardless of the level of intervention.

In considering areas of future research, the authors agree with Santos (2005) that much more is known about effects of idealized programs delivered under laboratory conditions (efficacy studies) than about the effects of programs as they are implemented in everyday life under real field conditions (effectiveness studies). The present study provides one such needed addition to the field.

As Santos has also noted, it is reasonable to believe that the active ingredient determining the effectiveness of home visiting programs is the quality of the relationship between the parent and the home visitor. Using a rigorous regression discontinuity design, Santos has confirmed this belief by demonstrating that improvement in the quality of the “working alliance” between parent and home visitor was related to improved parent and child outcomes. Because well-developed and reliable measures of the “working alliance” are readily available (Horvath 1994; Tracy and Kokotovic 1989), a valuable next step in evaluating the PAT program and other home visiting programs would be to include such measures (as the Early Head Start evaluation is presently doing).

The field appears to be in agreement that adding a simultaneous parent component to a program that works directly with children (the two-generation program) is of value (Brooks-Gunn and Markman 2005; Gomby 2005). The findings of this study, in conjunction with those of the Infant Health and Development Program (McCormick et al. 1998) and the Early Head Start follow-up study (Administration for Children and Families 2006) suggest that sequentially receiving a home visiting program followed by a preschool program is also of considerable value. Interestingly, as in the present study, the Early Head Start follow-up study also indicated that parents who received home visiting were more likely to place their children in an organized preschool setting.

The present findings of improved school readiness and academic achievement raise the question of whether the PAT program might also promote better social adjustment. The directors of the Syracuse Family Development Research Program, which—like PAT—was based on the premise “that parents are the primary teachers and sustaining caregiving persons in a young child’s life” (Lally et al. 1988, p. 81), found a significant reduction in criminal arrests among adolescents whose families received their program. Similar findings of reduced juvenile delinquency and/or adult criminal activity have been reported for the High/Scope project, in which children’s preschool teachers made regular home visits to work with parents (Schweinhart and Weikart 1997) and by the nurse home visitation program

evaluated by David Olds (Olds et al. 1998). Future evaluations of the PAT program thus might profitably examine this outcome as well.

There is a distinct possibility that positive effects on children of home visiting programs are being underestimated. Future home visiting research should, in addition to the target child, examine improvement in the behavior of the visited parents' younger children. Seitz, Rosenbaum, and Apfel (1985) also found that focusing early intervention directly on parents led to better school adjustment among children. Further, it was found that improvements in parenting practices generalized to later-born siblings as well (Seitz and Apfel 1994). This paper and other evaluations (Kagiticibasi et al. 2001) of the value of working directly with parents supports the developers of the Educate America Act, who asserted that in order for children to achieve school readiness, "every parent in the United States will be a child's first teacher and devote time each day to helping his or her preschool child learn, and parents will have access to the training and support parents need" (U. S. Department of Education 1993, p. 1).

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