

**Parental Notions of School Readiness:
How Have They Changed and Has Preschool Made a Difference?***

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Abstract

Despite their obvious importance, little attention has been paid to how parents view school readiness. This paper examines school readiness from the parental perspective, examining their efforts and expectations for kindergarten in conjunction with their child's development. Using data from two waves of the National Household Education Surveys, we test for changes in school readiness between 1993 and 2007 and relate these changes to the expansion of preschool enrollment. Over the 14-year period we observe a significant increase in parental reports of child development and a heightened set of expectations for what parents view as essential for entry into kindergarten; but we find only modest changes in parent effort. Preschool enrollment is strongly associated with child development and, even as preschool has expanded, the association is stronger in the more recent period. Preschool enrollment does not displace parental effort – they are moderately positively correlated – nor does it appear to play a strong role in shaping parental expectations of kindergarten readiness.

1. Introduction

The notion of school readiness, along with educational investments prior to kindergarten, has received considerable academic attention.¹ Recent research emphasizes how influences in early childhood foreshadow both adolescent and adult development (Heckman, 2008). Public preschool programs, Head Start, and Early Head Start are predicated on the long-term gains from investments in developmentally appropriate early childhood interventions, with many of these investments being the subject of intensive research (Gormley, 2007; Barnett, 2007). Yet, very little is known about either how parents prepare their children for school or what they think such preparation should entail (Barbarin et al., 2008; Diamond et al., 2000). Certainly, identifying parental effects on school readiness is a challenge: parents might have only vague conceptions of what school readiness is or how to promote it; and studies look mostly at parental behavior and so infer views about what parents consider school readiness to be. Also, parents are not solely directed to optimize school readiness; they may care about other goals for their children. Nevertheless, given the obvious salience of parents, as well as frequent calls for parental involvement programs to improve school readiness, more attention to parental beliefs and actions is needed.

Our investigation is an attempt to fill some of this gap by looking simultaneously at child development, parental efforts to promote that development, and parental understanding of kindergarten readiness. We use two nationally representative surveys to look at what determines school readiness in cross-section as well as how school readiness has changed between 1993 and 2007. There are many potential factors influencing school readiness, but we focus on preschooling. Critically, preschool programs might serve either as a complement to, or substitute for, parental efforts toward school readiness. That is, parents might see preschool as a way of enhancing their own school readiness efforts; or they may view it as a way of “outsourcing” school readiness so as to focus on other goals. Moreover, as preschool provision has expanded, we might expect its influence on parental beliefs about school readiness to have changed.

Our empirical analysis uses the National Household Education Surveys from 1993 and 2007. Both surveys include extensive questions on parental beliefs about school readiness and

¹ As examples, see the special issues of two journals – *Future of Children* (2005) and *Early Education and Development* (2000) – devoted to school readiness. The literature on the link between school readiness in terms of academic tests and child development is vast. Our focus is on a mediating factor - parental beliefs and actions – which has received much less attention.

these responses can be compared across the time periods. In this paper we first describe school readiness and apply an economic interpretation whereby readiness depends on the family and early education inputs used to produce it. We document how readiness has changed between 1993 and 2007, with a particular focus on preschool enrollment. We then look at how child development, parental efforts, and school readiness beliefs have changed over time. Next, we test for the effect of preschool enrollment on school readiness, including several tests to adjust for endogeneity bias. Finally, we offer some tentative conclusions and directions for further research.

2. School Readiness

2.1 School Readiness and Family Efforts

Our interest is in parental efforts toward, and conceptions of, school readiness. Parents play the ultimate role in determining school readiness; they do so not only by promoting their children's development, but also in deciding when to send them to school and which school to send them to. Thus, parental beliefs and actions are critical to understanding school readiness. Moreover, these relationships may be extremely nuanced (on early literacy, see Senechal and LeFevre, 2002) and vary across socioeconomic status (on low-income families, see Chazan-Cohen et al., 2009).

In the policy realm, there is broad consensus on the domains of school readiness (National Education Goals Panel, 1991). These are: health and motor skills; social and emotional development; approaches to learning; language skills; and general knowledge. But this consensus does not readily translate either into state policies or kindergarten teacher perspectives. Scott-Little et al. (2006) document that state standards typically emphasize language and knowledge, i.e., the last two of the five domains. Barbarin et al. (2008) report that teachers emphasize attitudinal competencies and basic health, i.e., the first three domains. There is also debate over the appropriate role of the school and whether school readiness skills should in fact be interpreted universally across all children or allowances should be made for variations in development (Snow, 2006). These unresolved issues are summarized in Barbarin et al. (2008), to which might be added the possibility for discrepancies between preschool teacher and kindergarten teacher views of school readiness.

Given this disjuncture and debate, we might expect parents to have a variety of opinions on, and so undertake a range of actions in relation to, school readiness. Here we focus on the relationship between child development, parental beliefs and actions; we do not adjudicate on whether children are ready for school, only on what their parents think about school readiness.² In fact, Barbarin et al. (2008) find that parental beliefs are related to subsequent child development, i.e., there is congruence between what parents think is important and how their children's skills develop; Okagaki and Sternberg (1993) also find that parental emphases on conformity are identifiable in teachers' ratings of child behavior in school. Nevertheless, the authors of the former study contend that parents may have an overly narrow view of school readiness, placing little emphasis on inferential skills. Plus, we cannot automatically tie child development and parental efforts to beliefs about school readiness: parents might consider some efforts necessary, independent of their kindergarten enrollment decisions. However, regardless of whether parents are perfectly or imperfectly guided, understanding their beliefs is still necessary.

The literature on parental ideas about school readiness is both limited and mixed in its findings. In a study similar to ours, Diamond et al. (2000) explain parental views of school readiness using the earlier of our two datasets (1993 NHES). They model school readiness in terms of parental education, race/ethnicity, child age, gender, academic skills, behavior, preschool enrollment, home learning, and educational television viewing. Looking at parental concerns about kindergarten and parental intentions to delay kindergarten entry (but not beliefs about what is important for kindergarten), Diamond et al. (2000) find strong associations with parental characteristics and child characteristics. But they find no independent effect of home activities (home learning and educational television); and neither the independent effect of preschool enrollment nor separable elements of child development are reported. Piotrkowski et al. (2000) investigate parental views of school readiness in high-need, minority communities and find agreement on basic competencies such as English language acquisition but few differences across ethnic groups (but see Okagaki and Sternberg, 1993). A related study is that of Barbarin et al. (2008), who examine parental school readiness beliefs and socioeconomic status (SES) and

² We assume that delaying entry to kindergarten reflects a lack of readiness although for some parents it may reflect strategic considerations (Datar, 2006).

ethnicity from interviews with 452 parents of 4-year-olds in the early 2000s. Surprisingly, this study, too, finds only modest associations between parental beliefs and SES or ethnicity.³

In light of the above, we expect that parental beliefs will reflect parental actions, albeit with considerable unexplained variation, and that actions are easier to model than beliefs. To better explain parental actions, we adopt an economic framework. That is, school readiness has to be “produced” and this requires resource inputs.⁴ So, where the child is in poor health or has low health status, more resources will be needed to reach a given threshold of school readiness (Mistry et al., 2010; Hayes et al., 2006). Also, families that have more resources, or higher quality resources, are better able to help their children be ready for school (at least as they understand readiness). Families with more resources might be described as having higher SES, which Duncan and Magnuson (2005) disaggregate into family income and structure, parental education, and neighborhood conditions. Notwithstanding the mixed evidence, we expect higher family income will increase school readiness and teen motherhood will decrease it. Also, the nature of child care is likely to be a key factor.⁵ Where parental care is significantly constrained, school readiness is likely to be adversely affected. This would lead to a negative association between maternal employment (net of the additional income) and paternal absence with school readiness. Also, children may receive less one-on-one parental care in larger families (Hanushek, 1992). Some parents, e.g., older or more educated mothers, may have a better understanding about how to promote school readiness. Thus, our framework includes controls both for parental and family characteristics.

Our primary focus is on preschool enrollment. There is clear evidence that preschool is beneficial for children for instance in terms of increasing social mobility or school performance (Barnett and Belfield, 2006; Magnuson et al., 2007). As such, we would expect it to be positively correlated with basic indicators of child development.⁶ In this respect, preschool is a

³ Using open-ended questions, the study allows for a nuanced conception of school readiness but the sample is a cross-section of children in preschool and so cannot test for variation across preschool enrollment.

⁴ This economic approach is consistent with other approaches. For example, Barbarin et al. (2008, p.672) describe how “parents invest energy and time... to promote the acquisition of the skills they believe are needed by their children.” By specifying more exactly the inputs of energy and time, the economic approach simply extends this depiction.

⁵ Note that “time” is not really a resource input: children are not left without care (or unsupervised) before they enter school. Instead, some expenditures of time are more efficient at increasing school readiness than other expenditures; and some care-givers are better directed toward enhancing school readiness than others.

⁶ Given the weak relationship between maternal employment and preschool availability (Fitzpatrick, 2010), it is unlikely that preschool provision has allowed mothers to work and fully “outsource” school readiness tasks.

complement to the parental role. As well, preschool may play a role in defining parental expectations of what children should need in order to be ready for school; presumably this will be a positive feedback such that preschool raises parental expectations. However, preschool may displace some parental activities (or even be discordant with some family practices).⁷ For example, parents might expect that their preschool will teach children numbers and letters, leaving them free to promote other aspects of child development. Thus, even where a child's school readiness is enhanced, it may not be as a result of parental actions directly; or preschool may make a child more ready for school and allow parents to promote different forms of development.

These relationships have received little academic attention, despite the importance of preschool as a policy for promoting child development and public investments in preschool programs. Between 1986 and 2000, preschool enrollment of 4-year-olds grew from 23 percent to 65 percent (Bainbridge et al., 2005); NCES (2009) data show an increase in 4-year-olds in nursery school from 49 percent in 1990 to 59 percent in 2007. Many more children now have some experiences in preschool before going to school. Commensurate with this growth in enrollment has been an expansion of public funding and greater accountability (NIEER, 2011; Magnuson et al., 2007, Table 1). Thus, we are interested not only in how preschool influences development and readiness, but whether its influence has changed over the period. More generally, we can see if parental beliefs, which seem hard to identify, exhibit some stable patterns over time or if they have changed in correspondence with other changes.

2.2 School Readiness Over Time

Several historical factors might lead us to expect improvements in family investments in school readiness. One is the fall in the teenage pregnancy rate (from 62 per 1,000 in 1989 to 39 births per 1,000 in 2007): teen mothers typically have fewer resources and less information about how to promote school readiness.⁸ Another factor might be income growth, although this has been concentrated mostly at the upper end of the distribution. A third factor might be the trend toward smaller family sizes (and changes in family composition), allowing parents to devote more resources to each individual child. A potentially important trend is mediated through changing

⁷ We refer to the extensive literature on mismatch between parents' and preschool teachers' approaches to learning and child development (see Barbarin et al., 2010). Our focus is on basic indicators of parental actions and beliefs, rather than on parenting styles and so we do not review this literature.

⁸ "U.S. Teenage Birth Rate Resumes Decline" at <http://www.cdc.gov/nchs/data/databriefs/db58.htm>.

parental views about school readiness, i.e., the growing recognition that the early years of childhood are critical for development. This should lead to greater investments by parents.

Of key interest is the change in the rate of preschool enrollment. As noted above, preschool enrollment rates have grown significantly over the period, particularly amongst younger children, and the increase in public funding suggests that the quality of these programs may have improved also (Besharov and Higney, 2006). Unless preschool programs have completely displaced parental efforts, we would expect their expansion to have positively affected school readiness. Reflecting the expansion in preschool enrollment is the growing recognition of the developmental significance of the early childhood years (Heckman, 2008). Insofar as parents have recognized this significance, we would expect their beliefs and actions to have changed accordingly. In part, this change may be captured by higher rates of enrollment in preschool.

More generally, recent evidence summarized by Lynn (2009) shows that child development – as measured by development quotients – has been improving over time both in infants and preschool age children. The causes of this improvement are much debated, but they suggest a strong presumption toward heightened child development in the later cohort.

Nevertheless, there are countervailing trends, potentially reducing parental investments in school readiness. Rates of single motherhood have increased. Thus, although resident fathers are now contributing more time toward school readiness, this extra commitment is not substantial and is dominated by the increase in non-resident fatherhood. Equally salient may be the increase in labor market participation of mothers and their more rapid transition back into the labor market (Attanasio et al., 2008). Also, after 1996 the welfare safety net became more restrictive and attenuated somewhat during the 2000s (Kaushal et al., 2007; Currie, 2008). Lastly, some demographic changes may be influential: expectations for school readiness vary with cultural norms and immigrant status (Okagaki and Sternberg, 1993).

Finally, there are some reasons why parental investments in relation to school readiness might not have changed over this 15-year period. Infant health status, which is important for school readiness, is not much changed in some respects – the rate of low birth-weight babies, for example, was 6 percent in 1989 and 6.5 percent in 2009 (Currie, 2011) – even as infant nutrition and health may have improved. No change might also be expected given the flat level of overall

attainment across school cohorts (Heckman and LaFontaine, 2010): absent changes in parental human capital, we might expect no changes in school readiness (Geoffrey et al., 2010).

2.3 Hypotheses about Parental Actions and Beliefs on School Readiness

We apply several different approaches to investigate parental actions and beliefs on school readiness. We identify eight basic measures of child development, e.g., whether a child can identify colors or write his or her own name. We also identify eight parental actions that might be associated with child development, e.g., telling the child stories, teaching the letters, and letting them watch television. All 16 measures are based on parental reports. Next, we identify four measures of what parents believe are essential in order to be ready for kindergarten (knowing letters, using pencils, counting, and sharing). Finally, we create an indicator for the likelihood that the parent will delay the child's entry into kindergarten. Our analysis has two parts. The first is to look at how patterns have changed over time. The second is to examine the role of preschool enrollment both in cross-section and over time.

Our examination of patterns over time has several elements. We begin by estimating the determinants of these child development measures, including the range of covariates specified above (e.g., teen motherhood, family income). Using pooled data from two time periods (1993 and 2007), we are able to see whether child development has “improved” over the period, i.e., if more parents report that their children can, for example, identify all the colors. In parallel, we estimate the determinants of parental actions to help child development, again using pooled data to see if parents in the more recent sample are undertaking more efforts to promote this development. We then investigate parental beliefs about what it means to be ready for kindergarten and whether parents are now more likely to delay their child's entry into kindergarten.

In light of the family, policy-related, and contextual changes, we anticipate that child development would be enhanced and that these enhancements would be partly a function of increased parental efforts and partly a function of greater rates of preschool enrollment. Alternatively, parental efforts may have decreased – being partially offset by preschool – with a net positive effect on child development. Correspondingly, we might expect parents' beliefs about what skills are essential for kindergarten to have ratcheted upward. Kindergarten delay rates might therefore either rise if parents now believe their child is not ready or fall if preschool has made the parents more confident their children is ready (we discount changes in parental

strategies for their children to gain a competitive edge over their peers). For each formulation, we adjust for basic child and family characteristics.

Our second analysis is to look at the effect of preschool enrollment on child development, parental efforts, and parental views about school readiness. Given the substantial and compelling evidence on the benefits of preschool, we would expect enrollment to be positively associated with parental reports of child development. This association has been found in many studies that use test score data, but it is important for our framework that parents perceive the developmental benefits too. A more novel examination is of parental actions and preschool enrollment: we test whether preschool enrollment is associated with more or fewer parental efforts. We then test to see if parental beliefs about kindergarten skills depend on whether the child is in preschool and whether kindergarten delay is associated with preschool enrollment. Finally, given increases in preschool enrollment, we investigate whether these relationships are stable across the time periods. Our expectation, given increases in funding for preschool, is that the impact of preschool has increased.

3. Data

We use two waves of the National Household Education Surveys (NHES). These surveys are conducted periodically by the National Center for Education Statistics (NCES) and the School Readiness module was administered in the 1993 and 2007 waves. The NHES asks parents an array of questions about their family circumstances, early education provision, their home activities, and their child's readiness for school. The NHES includes specific questions about: parents' beliefs about school readiness; the child's development; home activities oriented toward school readiness; and kindergarten decisions.

Details on the sampling frame for each survey are given in NHES (1997) and O'Donnell and Mulligan (2008) respectively.⁹ Critically, the surveys are harmonized so as to elicit the same information from a sample representing all U.S. households. Thus, it is possible to see how investments in, and parental beliefs about, school readiness have changed over time.¹⁰ However, there are some differences in question structure and wording such that the responses are not precisely harmonized. We highlight these differences below.

⁹ The Users Guide from 1997 is at <http://nces.ed.gov/pubs97/97561.pdf>. Full information on the NHES 2007 School Readiness module is given in O'Donnell and Mulligan (2008).

¹⁰ As noted by O'Donnell and Mulligan (2008, p.1), "the 2007 SR [school readiness] data can be compared to the 1993 SR to study change across a wide range of issues."

We restrict our analysis to children aged 3 and 4, i.e., those who are not in kindergarten yet. This yields samples as per Table 1. Sampling weights are available for each survey and we apply these throughout. As we analyze only a subsample, we check to see if the weights alter our findings.

The NHES samples – in contrast to other available datasets – are large and nationally representative to encompass a full range of parental perspectives. However, the NHES data are from parental responses to closed questions. They do not allow for analysis of subtle parental efforts (or any analysis of parenting styles). Responses may reflect parental bias about their child, particularly with respect to the measures of child development and parental efforts. Critically, we note that the questions are slightly different across the two surveys. In 1993, the question was “How important you think it is for any child to know or do certain things to be ready for kindergarten?” In 2007, the question was “How important you think it is for you to do certain things to prepare your child for kindergarten?” Parents might apply stricter standards to their own children (such that more parents would respond that these things are essential in 2007). In contrast, parents might think that it is not their responsibility but the preschool’s (such that fewer parents would respond that these things are essential in 2007).

Our empirical approach should mitigate these issues. Our primary goal is to identify changes over time: measurement error, self-report exaggeration, and bias would have had to mutate across the time periods in order to invalidate any observed changes. Our econometric specifications use the same sets of controls for family and demographic characteristics in 1993 as in 2007. For our analysis of preschool, parents are assumed to make rational decisions about the benefits of enrollment in both periods. Indeed, with increased enrollment over this period, the effect of preschool might be expected to have diminished as the marginal enrollee gains less than the infra-marginal.

Table 1 shows the descriptive frequencies for the 4-year-olds in each year (weighted sample).¹¹ The racial composition of the sample has changed, along with the proportion with first language not English, reflecting demographic changes. Disability rates also appear to have grown significantly across the samples.¹² Single motherhood is lower in 2007, but teenage

¹¹ The unweighted sample in 1993 appears more advantaged (notably in maternal characteristics such as education) than the weighted frequencies in Table 1. But for 2007 the unweighted and weighted frequencies are very similar.

¹² This is despite a change in the definition of disability that is actually more restrictive in 2007. We note that these disability measures do not include ADD, ADHD or autism, as these were not asked in 1993.

motherhood is higher. Notably, the mothers in the 2007 sample have higher levels of education and are more likely to be employed and in full-time work. Family size is stable. Overall, therefore, there are some changes that might lead us to expect family resources for school readiness to be diminished and others that suggest the reverse.

Table 2 shows the descriptive statistics of child development, family effort, and school readiness variables for the 3- and 4-year-olds in the sample (weighted).¹³ Notably, child aptitude has increased (at least according to parental reporting): significantly higher proportions of parents in 2007 report that their 4-year-old meets a range of developmental milestones (identify colors, recognize all the alphabet, count beyond 20, write name, read written words, and read books on own). These aptitudes appear to be unrelated to a basic measure of whether the child fidgets, which is a stable proportion of 4-year-olds. Interestingly, for the 4-year-olds parental effort does not appear to have increased much between 1993 and 2007: similar percentages of parents told stories and taught letters over the previous week and visited a museum over the previous month; more parents taught songs/music and did art activities; but fewer families visited a library.¹⁴ The proportion of 4-year-olds read to every day increased by 4 percentage points, and television watching has fallen from 3.4 to 2.1 hours per day. In somewhat contrast, parental effort has increased for the 3-year-olds: parents seemed to be more involved in home activities such as telling stories, teaching letters, songs, doing arts and crafts or even visiting a museum. The notable accord is over television viewing, time 3-year-olds spent watching television has fallen from 3.4 to 2.0 hours per day.

The bottom panel of Table 2 shows parental views on what children need to be ready for kindergarten. The differences are substantial and indicate a much greater expectation on the part of parents in 2007 than in 1993. Between twice and three times as many parents in 2007 believe that it is essential for children to know the letters, be able to use pencils and paint-brushes, count beyond 20, and take turns. Finally, preschool enrollment has grown significantly over the period (54.6 versus 62.1 percent in 2007) for the 4-year-olds, but is unchanged for the 3-year-olds. The proportion of parents who expect their child to enroll late in kindergarten has fallen slightly. Values observed in the table indicate that it does not seem that parental expectations are a

¹³ The unweighted frequencies in 1993 are very similar to the weighted frequencies. However, for 2007 the unweighted frequencies are even higher than the weighted frequencies. Thus, using unweighted estimation would exacerbate the gap across the time periods.

¹⁴ The NHES do not include detailed information about the extent to which such efforts are nurturing or authoritarian (Chazan-Cohen et al., 2009).

function of the age of the children. On average, parental expectations for the 3-year-olds are equal to parental expectations described for the 4-year-olds. The proportion of parents who expect their 3-year-old child to enroll late in kindergarten has fallen slightly.

4. Results

4.1 Changes Over Time

First, we report on how child development, parental efforts, and school readiness have changed over time. Pooling the two surveys, we estimate probit specifications for each of the indicators, split for children ages 3 and 4.¹⁵ We control for an array of child-related and maternal characteristics (and preschool enrollment) and we apply the survey weights.¹⁶ A binary indicator for 2007 is included to establish whether there has been a substantial change since 1993.

The top panel of Table 3 reports the coefficients for the year 2007 for the child development and parental effort equations. Emphatically, the parents in the 2007 sample are significantly more likely to report much higher levels of child development than in 1993, both at age 3 and 4. All child development indicators are higher and the differences are statistically significant after controlling for family characteristics. The magnitude of the effect is surprising, although we note that shift accords with the evidence in Lynn (2009) regarding changes in Developmental Quotients. Notably, the only indicator that is unchanged over the period is whether the child fidgets a lot.

The bottom panel of Table 3 shows how parental efforts have changed over the period. Interestingly, although some parental efforts are greater in 2007, others are unchanged (and library visits are fewer). Even as parental reports of child literacy are higher in 2007, daily and weekly reading efforts are unchanged, as are family efforts to teach the letters. The one exception is television watching, which appears to have fallen since 2007.¹⁷ Thus, although child development appears to be enhanced, this enhancement cannot easily be explained by parental efforts. As a validity check, we re-estimate the child development equations from Table 5 including the measures of parental effort. The corresponding preschool coefficients are reported in Appendix Table 1. Although the coefficients are attenuated in comparison to those in

¹⁵ For hours of television watching, we apply a Tobit estimation.

¹⁶ Results using unweighted data are even stronger than using weighted data (details available from the authors).

¹⁷ Questions about internet use or portable DVD use are not available.

Table 5, Appendix Table 1 shows that preschool is associated with higher levels of child development and that these effects are stronger in 2007.

Table 4 shows how parental conceptions of school readiness have changed between 1993 and 2007. For both 3- and 4-year-olds, the proportion of parents who believe some skills are essential has risen substantially. Controlling for child and maternal characteristics, parents are much more likely to say that it is essential for children to know the letters, be able to use pencils, count beyond 20, and take turns.¹⁸ Thus, enhanced child development and heightened parental expectations appear to be moving in tandem.

Finally, the bottom panel of Table 4 shows the changes in kindergarten delay by parents.¹⁹ Broadly, kindergarten delay is only modestly affected. For 3-year-olds, there is a reduction in the propensity to delay kindergarten, but there is no effect for 4-year-olds for whom the measure is more salient. The results do not depend on whether we include parental expectations for kindergarten (final row of Table 4).

4.2 The Influence of Preschool on School Readiness

The changing patterns described above may be partly explained by preschool enrollment rates. Here we examine how child attendance in preschool influences development, parental efforts, and the process of school readiness. Given the wealth of literature, we strongly expect that the developmental relationship will be positive: parents of children in preschool should report higher levels of development. That said, we cannot be specific about which domains of school readiness are most affected. The relationship between preschool and parental effort is more ambiguous as these may be either substitutes or complements. Preschool might raise parental expectations of what is needed for kindergarten, although the literature suggests that these expectations are often opaque. Finally, preschool should reduce kindergarten delay (unless it has ratcheted upward parental expectations of what is essential before entry).

¹⁸ The coefficients on the control variables are available from the authors. However, we do find some statistically significant influences on parental expectations regarding kindergarten readiness. These include: maternal education and employment; English not the first language; and ethnicity, although not consistently so.

¹⁹ We report kindergarten delay using the age-derived school date cut-off measure. This measure yields a higher frequency of kindergarten delay than the parental report measure (see Table 2). However, the results are similar when we use the latter measure in our estimations (details available from the authors).

For each of the specifications we estimate a probit equation with controls for individual and maternal characteristics (itemized in Table 1). We report the coefficient for preschool enrollment in Table 5 based on separate estimations by child age and survey year.²⁰

Table 5 shows a strong, statistically significant influence of preschool on child development across all domains, for both age groups and years. The effect is particularly strong for letter recognition and the ability to write one's name. The effects are stronger for 4-year-olds. They are also stronger for the 2007 cohort. Again, the basic behavioral attribute – fidgeting – is discrepant. Overall, a plausible inference is that – as child development has been enhanced despite limited changes in parental efforts – preschool plays an increasingly important role as a complement to parental efforts.²¹

Our second investigation directly addresses this issue by looking at how preschool enrollment is associated with parental efforts. The bottom panel of Table 5 shows only a moderate influence of preschool on parental efforts. The association is positive, although not consistently so across all the measures. That said, preschool does not appear to displace parental efforts. The strongest association is between preschool enrollment and television watching, with viewing being much lower by preschoolers.²² Again, the effects are greater for the 2007 cohort.

Our third hypothesis is that preschool enrollment will influence parental expectations of what a child should know before entry to kindergarten. These associations are reported in Table 6. There is only modest support for this hypothesis: families who enroll in preschool do not appear to have higher expectations of what is needed to be ready for school (or at least not consistently so). Nevertheless, this finding is of interest: it suggests that the benefits from preschool are not attributable to a failure to control for parental motivations. Finally, Table 6 shows a strong effect of preschool on the decision to enroll in kindergarten at the expected time. For the 4-year-olds in both 1993 and 2007, kindergarten delays are much less common among

²⁰ Sample weights are applied throughout. Again, results using unweighted data are stronger than using weighted data (details available from the authors).

²¹ We also estimate a stricter test of the change in the impact of preschool over time. We re-estimate Table 5 using a full interaction model on the pooled sample of both years of data. The coefficient on the interaction of preschool with the year dummy for 2007 provides a strict test of whether preschool matters more for the more recent cohort. Although the interaction terms on child development are mostly positive, many of them are no longer statistically significant. Details are available from the authors.

²² Although studies of the effects of television watching on child development do not unambiguously find adverse effects, television watching in the early years has been linked to subsequent attention span deficiencies and may play a role in childhood obesity (see Christakis et al., 2004).

children enrolled in preschool (even when we control for parental expectations). This is consistent with the developmental advantages reported in Table 5.

4.3 Sensitivity Tests on the Influence of Preschool

It is possible that the decision to enroll in preschool is endogenous to the parents' views about school readiness and the child's developmental aptitude. Parents are more likely to enroll their child in preschool if they feel the child lacks developmental or social skills. One response is that as preschool programs have expanded their effects might have weakened. The fact that we find the opposite is therefore supportive of improvements in preschool quality since 1993. However, we also perform two alternative tests to check the findings.

Our first check is by re-estimating the equations in Tables 4 and 5 using propensity score matching (PSM). We perform three specifications, deriving coefficients from weighted adjusted PSM, for the Average Treatment Effect (ATE), and for the Average Treatment on the Treated (ATT) effect. The results for the 2007 NHES for the 4-year-olds are given in Appendix Tables 2 and 3. They accord with our preferred specifications described above: a strong association with child development, modest but non-negative effects on parental effort, null effects on parental expectations, and reduced kindergarten delay.

Our second validity check exploits the harmonized nature of the datasets. First, we use the 1993 NHES to predict the probability of being in preschool based on our set of family and demographic controls (Table 1). We then use these probabilities to determine which of the 2007 cohort of preschool children would not have been in preschool had they grown up in the earlier cohort. These are the newly induced preschool enrollees and we might expect them to have weaker gains than those children who would definitely enroll in either cohort. (We perform this predictive exercise separately for 3-year-olds but these results are of less interest). As shown in Appendix Tables 4 and 5, the results agree almost completely with our preferred specification. The advantages of preschool are evident even across the newly induced children.

5. Conclusions

Despite their obvious importance, little attention has been paid to how parents view school readiness and what influences their expectations about kindergarten. Both lacunae are surprising: parents are the primary influences on child development; and the K-12 literature on the importance of parental expectations is large (Entwistle et al., 2005).

Our investigation examines parental efforts and expectations for kindergarten, in conjunction with their child's development and in relation to the growth in preschool enrollment. Our main focus is on changes over the period 1993 to 2007. We find substantial increases in parental reports of child development that cannot be fully explained by changes in sample composition. However, we find little change in basic indicators of parental effort, with the exception of television watching which has fallen considerably. Commensurate with children's enhanced development, parental expectations of what is essential for kindergarten have grown over the period. Rates of delayed entry into kindergarten (based on parental intent) are unchanged.

Preschool enrollment plays an important role. It is strongly associated with parental reports of child development and with parental intentions about delaying entry to kindergarten. It is only modestly linked to parental efforts, although its role in reducing television viewing appears substantial. But this may be interpreted benignly: preschool is not displacing parental efforts. Perhaps surprisingly, preschool appears to have no association with parental expectations about what skills children need to enter kindergarten.

Any policy implications of our findings should be viewed with caution. Plausibly, we affirm the well-documented finding about the efficacy of preschool and the fact that its effects are greater in the more recent period adds credibility. But there have been many economic, social, and familial changes between 1993 and 2007 that may explain our findings. More critically, our understanding of parental expectations for kindergarten entry is preliminary at best. More research is needed to explain how and when these expectations are formed, how important and accurate they are, as well as how they might be shaped by parental involvement programs and kindergarten entry policies.

References

- Attanasio, O., Low, H. & V. Sanchez-Marcos. 2008. Explaining changes in female labor supply in a life-cycle model. *American Economic Review*, **98**, 1517-1552.
- Bainbridge, J., Meyers, M. K., Tanak, S. & J. Waldfogel. 2005. Who gets an early education? Family income and the enrollment of three- to five year-olds from 1968 to 2000. *Social Science Quarterly*, **86**, 724-745.
- Barbarin, O.A., Downer, J., Odom, E. and D. Head. 2010. Home-school differences in beliefs, support, and control during public pre-kindergarten and their link to children's kindergarten readiness. *Early Childhood Research Quality*, **25**, 358-372.
- Barbarin, O.A., Early, D., Clifford, R., Bryant, D., Frome, P., Burchinal, M., Howes, C. and R. Pianta. 2008. Parental conceptions of school readiness: Relation to ethnicity, socioeconomic status, and children's skills. *Early Education and Development*, **19**, 671-701.
- Barnett, W.S. and C. R. Belfield. 2006. Early childhood development and social mobility. *Future of Children*, **16**, 73-98.
- Barnett, W.S. 2007. Surprising agreement on Head Start: Compli/ementing Currie and Besharov. *Journal of Policy Analysis and Management*, **26**, 685-686.
- Besharov, D and CA Higney. 2006. Federal and state child care expenditures 1997-2003): rapid growth followed by steady spending. Report to the US Department of Health and Human Services, University of Maryland Working Paper.
- Chazan-Cohen, R, Raikes, H, Brooks-Gunn, J, Ayoub, C, Pan, BA, Kisjer, EE, Roggman, L and AS Fuligni. 2009. Low-income children's school readiness: Parental contributions over the first five years. *Early Education and Development*, **20**, 958-977.
- Christakis, D.A., Zimmerman, F.J., DiGiuseppe, D.L., and C.A. McCarty. 2004. Early television exposure and subsequent attentional problems in children. *Pediatrics*, 113;708.
- Currie, J.M. 2008. *The Invisible Safety Net: Protecting the Nation's Poor Children and Families*. Princeton University Press: Princeton, NJ.
- Currie, J.M. 2011. Inequality at birth: Some causes and consequences. *American Economic Review*, **101**, May, 1-22.

- Datar, A. 2006. Does delaying kindergarten entrance give children a head start? *Economics of Education Review*, **25**, 43-62.
- Diamond, K.E., Reagan, A. and J. Bandyk. 2000. Parents' conceptions of kindergarten readiness: relationships with race, ethnicity, and development. *Journal of Educational Research*, **94**, 93-100.
- Duncan, G.J. and K.A. Magnuson. 2005. Can family socioeconomic resources account for racial and ethnic test score gaps? *School Readiness: Closing Racial and Ethnic Gaps*, **15**, 35-54.
- Entwisle, D. R., Alexander, K. L., and L. S. Olson. 2005. First grade and educational attainment by age 22: A new story. *American Journal of Sociology*, **110**, 1458-1502.
- Fitzpatrick, M.D. 2010. Preschoolers enrolled and mothers at work? The effects of universal prekindergarten. *Journal of Labor Economics*, **28**, 51-85.
- Geoffroy, M.C., Cost, SM, Giguere, CE, Dionne, G, Zelazo, PD, Tremblay, RE, Boivin, M and JR Seguin. 2010. Closing the gap in academic readiness and achievement: the role of early childcare. *Journal of Child Psychology and Psychiatry*, **51**, 1359-1367.
- Gormley, W.T. Early childhood care and education: Lessons and puzzles. *Journal of Policy Analysis and Management*, **26**, 633-671.
- Hanushek, E.A. 1992. The trade-off between child quantity and quality. *Journal of Political Economy*, **100**, 84-117.
- Hayes, H., Luchok, K., Martin, A.B., McKeown, R.E. and A. Evans. 2006. Short birth intervals and the risk of school unreadiness among a Medicaid population in South Carolina. *Child Care Health and Development*, **32**, 423-430.
- Heckman, J.J. 2008. Schools, skills, and synapses. *Economic Inquiry*, **46**, 289-324.
- Heckman, J.J. and P.A. LaFontaine. 2010. The American high school graduation rate: Trends and levels. *Review of Economics and Statistics*, **92**, 244-262.
- Kaushal, N., Gao, Q. & J. Waldfogel. 2007. Welfare reform and family expenditures: How are single mothers adapting to the new welfare and work regime? *Social Service Review*, September, 369-396.
- Lynn, R. 2009. What has caused the Flynn effect? Secular increases in the Development Quotients of infants. *Intelligence*, **37**, 16-24.
- Magnuson, K.A., Ruhm, C. and J. Waldfogel. 2007. Does prekindergarten improve school preparation and performance? *Economics of Education Review*, **26**, 33-51.

- Mistry, R.S., Benner, A.D., Biesanz, J.C., Clark, S.L., and C. Howes. 2010. Family and social risk, and parental investments during early childhood years as predictors of low-income children's school readiness outcomes. *Early Childhood Research Quarterly*, **25**, 432-449.
- National Center for Education Statistics (NCES). 2009. *Digest of Education Statistics*. U.S. Department of Education: Washington, DC. Retrieved May 30, 2011 from http://nces.ed.gov/programs/digest/d09/tables/dt09_043.asp.
- National Education Goals Panel (NEGP). 1991. *The National Education Goals Report*. Washington, DC.
- National Institute for Early Education Research (NIEER). 2011. *The State of Preschool 2010*. Report, at <http://nieer.org/yearbook/pdf/yearbook.pdf>.
- O'Donnell, K. and G. Mulligan. 2008. *Parents' Reports of the School Readiness of Young Children from the National Household Education Surveys Program of 2007*. National Center for Education Statistics, NCES 2008-051: Washington, DC.
- Okagaki, L. and R. Sternberg. 1993. Parental beliefs and children's school performance. *Child Development*, **64**, 36-56.
- Piotrkowski, C.S., Botsko, M and E Matthews. 2000. Parents' and teachers' beliefs about children's school readiness in a high-need community. *Early Childhood Research Quarterly*, **15**, 537-558.
- Scott-Little, C., Kagan, S. and V Frelow. 2006. Conceptualization of readiness and the content of early learning standards: the intersection of policy and research? *Early Childhood Research Quarterly*, **21**, 153-173.
- Senechal, M. and J LeFevre. 2002. Parental involvement in the development of children's reading skill: a five-year longitudinal study. *Child Development*, **73**, 445-460.
- Snow, K. 2006. Measuring school readiness: Conceptual and practical considerations. *Early Education and Development*, **17**, 7-41.

Table 1
Individual and Family Characteristics: Descriptive Frequencies
4-year-olds

	1993		2007	
<u>Child characteristics:</u>				
White	67.3		53.1	
Black	15.6		17.0	
Hispanic	12.9		20.5	
Other	4.2		9.3	
Female	52.4		47.0	
Excellent health	62.2		64.0	
Disability (boy)	12.5		18.5	
Disability (girl)	17.6		20.4	
<u>Maternal characteristics:</u>				
Single mother	26.3		19.4	
Married	74.3		75.6	
Teenage mother	16.4		21.8	
Age in years	31.1	[5.8]	33.3	[6.4]
High school dropout	16.2		12.3	
High school graduate	35.9		18.7	
Some college	30.5		31.8	
College education	17.4		37.2	
Unemployed	47.2		40.6	
Employed full-time	20.8		21.3	
Employed part-time	32.0		38.2	
First language not English	12.7		15.6	
Household size	4.4	[1.4]	4.5	[1.2]
Household size under 9/10	2.0	[0.9]	2.2	[0.9]
Household income	\$32,164	[24,163]	\$52,153	[29,839]
<i>N</i>	2,000		1,159	

Sources: NHES1993; NHES207. *Notes:* Sampling weights applied. Household income in nominal dollars. Standard deviations in brackets.

Table 2
Child Development, Parental Effort and School Readiness Expectations

	4-year-olds		3-year-olds	
	1993	2007	1993	2007
<u>Child can:</u>				
Identify all colors	84.2	87.2	68.6	74.3
Recognize all letters of alphabet	27.5	37.9	10.6	16.8
Count beyond 20	20.7	27.8	4.3	7.7
Write name	70.3	76.4	21.8	33.6
Read written words	2.4	5.3	0.8	0.8
Read story books on own	7.9	13.0	4.6	7.1
Child fidgets a lot	28.8	27.2	26.7	27.6
<u>In last week, did someone do following with child:</u>				
Tell story	75.5	76.4	77.5	79.6
Teach letters	88.0	85.8	84.6	87.4
Teach songs or music	67.7	76.0	75.9	83.0
Arts and crafts	69.4	88.8	67.2	90.7
Visit a library (in last month)	41.4	34.9	34.4	35.7
Go to a museum (in last month)	20.7	20.9	15.2	18.9
Hours child watches TV per week	3.41 [1.98]	2.07 [1.63]	3.43 [1.98]	2.03 [1.60]
Read to child every day	51.2	55.4	55.4	55.3
<u>It is essential that to be ready for kindergarten your/a child:</u>				
Knows the letters of the alphabet	16.1	58.1	16.2	52.7
Can use pencils and paint brushes	18.2	40.5	17.8	38.9
Can count to 20 or more	18.7	53.6	19.3	51.5
Takes turns and shares	30.1	62.7	31.9	59.6
Child enrolled in preschool	54.6	62.1	34.1	33.1
Expect child to enroll late to K (parent report)	7.7	5.7	6.8	5.2
Expect child to enroll late to K (based on age cut-off)	27.9	25.4	35.7	25.4
<i>N</i>	2,000	1,159	1,900	1,100

Sources: NHES1993; NHES207. *Notes:* Sampling weights applied. Standard deviations in brackets.

Table 3
Change in Child Development and Parental Effort 1993-2007

	3-year-olds		4-year-olds	
	Coefficient on year 2007		Coefficient on year 2007	
<u>Child can:</u>				
Identify all colors	0.245***	(0.079)	0.061	(0.113)
Recognize all letters of alphabet	0.234***	(0.075)	0.183**	(0.075)
Count beyond 20	0.209**	(0.094)	0.133*	(0.072)
Write name	0.341***	(0.069)	0.114	(0.090)
Read written words	-0.036	(0.178)	0.314***	(0.111)
Read story books on own	0.175*	(0.095)	0.162**	(0.081)
Child fidgets a lot	0.031	(0.072)	-0.034	(0.082)
<u>In last week, did someone do following with child:</u>				
Tell story	0.070	(0.077)	-0.040	(0.086)
Teach letters	0.129	(0.081)	-0.120	(0.114)
Teach songs or music	0.245***	(0.077)	0.189**	(0.079)
Arts and crafts	0.947***	(0.093)	0.727***	(0.095)
Visit a library (in last month)	-0.038	(0.068)	-0.278***	(0.071)
Go to a museum (in last month)	0.044	(0.074)	-0.081	(0.074)
Hours child watches TV per week	-1.336***	(0.089)	-1.197***	(0.092)
Read to child every day	0.009	(0.067)	0.034	(0.071)

Sources: NHES1993, NHES2007. *Notes:* Sample weights applied. Standard errors in parentheses. Coefficient for year is reported for separate probit equations; Tobit equation used for hours child watches TV per week. Sample sizes vary across specifications, with minima of 2,936 (3-year-olds) and 3,063 (4-year-olds). Each specification controls for: preschool attendance (1 dummy variable), race (3); gender; child health (1); disability (1); single parent; mother's education (3); mother's work status (2); mother's first language not English; household size; number of children in household age under 9/10; and household income. *** p<0.01, ** p<0.05, * p<0.1.

Table 4
Change in School Readiness Expectations 1993-2007

	3-year-olds		4-year-olds	
	Coefficient on year 2007		Coefficient on year 2007	
<u>It is essential that to be ready for kindergarten child:</u>				
Knows letters of the alphabet	1.145***	(0.070)	1.149***	(0.078)
Can use pencils/paint brushes	0.657***	(0.067)	0.657***	(0.076)
Can count to 20 or more	0.966***	(0.068)	0.939***	(0.076)
Takes turns and shares	0.828***	(0.066)	0.824***	(0.074)
Child will delay kindergarten	-0.229***	(0.067)	-0.064	(0.075)
Child will delay kindergarten ^a	-0.264***	(0.076)	-0.090	(0.090)

Sources: NHES1993, NHES2007. *Notes:* Sample weights applied. Standard errors in parentheses. Coefficient for year is reported for separate probit equations. Sample sizes vary. Each specification controls for: preschool attendance (1 dummy variable), race (3); gender; child health (1); disability (1); single parent; mother's education (3); mother's work status (2); mother's first language not English; household size; number of children in household age under 9/10; household income; and preschool attendance. Child will delay kindergarten based on age cut-off. ^a Includes controls for parental expectations about kindergarten. *** p<0.01, ** p<0.05, * p<0.1.

Table 5
Effect of Preschool on Child Development and Parental Effort

	3-year-olds				4-year-olds				
	Preschool Coefficient		Preschool Coefficient		Preschool Coefficient		Preschool Coefficient		
	1993 NHES		2007 NHES		1993 NHES		2007 NHES		
<u>Child can:</u>									
Identify all colors	0.225***	(0.086)	0.450***	(0.132)	0.435***	(0.094)	0.380**	(0.177)	
Recognize all letters of alphabet	0.296***	(0.088)	0.552***	(0.119)	0.162**	(0.076)	0.298**	(0.129)	
Count beyond 20	0.099	(0.117)	0.293**	(0.147)	0.265***	(0.078)	0.576***	(0.132)	
Write name	0.370***	(0.081)	0.524***	(0.111)	0.498***	(0.075)	0.899***	(0.147)	
Read written words	0.693***	(0.247)	0.276	(0.348)	0.383**	(0.152)	0.456**	(0.222)	
Read story books on own	0.174	(0.126)	0.109	(0.147)	0.265***	(0.101)	0.387***	(0.146)	
Child fidgets a lot	0.008	(0.082)	-0.317***	(0.117)	-0.042	(0.075)	-0.234	(0.142)	
<u>In last week, did someone do following with child:</u>									
Tell story	0.017	(0.082)	-0.212*	(0.123)	0.190***	(0.073)	0.206	(0.142)	
Teach letters	0.064	(0.094)	0.295**	(0.126)	0.241***	(0.083)	0.495***	(0.167)	
Teach songs or music	0.086	(0.082)	-0.096	(0.132)	-0.046	(0.070)	0.006	(0.140)	
Arts and crafts	0.154*	(0.079)	0.201	(0.149)	0.157**	(0.072)	0.438***	(0.170)	
Visit a library (in last month)	0.154**	(0.077)	0.405***	(0.105)	0.061	(0.070)	0.137	(0.126)	
Go to a museum (in last month)	0.149*	(0.084)	0.375***	(0.108)	0.264***	(0.082)	0.243*	(0.137)	
Hours child watches TV per week	-0.645***	(0.105)	-0.415***	(0.148)	-0.454***	(0.105)	-0.486***	(0.151)	
Read to child every day	0.052	(0.076)	0.267**	(0.106)	0.225***	(0.070)	0.113	(0.126)	

Sources: NHES1993, NHES2007. *Notes:* Sample weights applied. Standard errors in parentheses. Coefficient for preschool is reported for separate probit equations; Tobit equation used for hours child watches TV per week. Sample sizes vary. Each specification controls for: race (3 dummy variables); gender; child health (1); disability (1); single parent; mother's education (3); mother's work status (2); mother's first language not English; household size; number of children in household age under 9/10; household income. *** p<0.01, ** p<0.05, * p<0.1.

Table 6
Effect of Preschool on School Readiness

	3-year-olds				4-year-olds			
	Preschool Coefficient				Preschool Coefficient			
	1993 NHES		2007 NHES		1993 NHES		2007 NHES	
<u>It is essential that to be ready for kindergarten child:</u>								
Knows the letters of the alphabet	-0.005	(0.087)	0.192*	(0.103)	0.054	(0.081)	0.134	(0.134)
Is able to use pencils and paint brushes	-0.026	(0.089)	0.072	(0.103)	0.081	(0.078)	0.116	(0.129)
Can count to 20 or more	-0.051	(0.086)	0.134	(0.104)	0.179**	(0.080)	0.107	(0.131)
Takes turns and shares	-0.021	(0.078)	0.238**	(0.109)	0.184**	(0.072)	0.129	(0.128)
Child will delay kindergarten	-0.049	(0.076)	-0.090	(0.108)	-0.311***	(0.075)	-0.276**	(0.123)
Child will delay kindergarten ^a	-0.055	(0.076)	-0.097	(0.109)	-0.336***	(0.075)	-0.269**	(0.122)

Sources: NHES1993, NHES2007. *Notes:* Sample weights applied. Standard errors in parentheses. Coefficient for preschool is reported for separate probit equations. Sample sizes vary. Each specification controls for: race (3 dummy variables); gender; child health (1); disability (1); single parent; mother's education (3); mother's work status (2); mother's first language not English; household size; number of children in household age under 9/10; household income. Child will delay kindergarten based on age cut-off. ^a Includes controls for parental expectations about kindergarten. *** p<0.01, ** p<0.05, * p<0.1.

Appendix Table 1
Effect of Preschool on Child Development
(Adjusting for Parental Effort)

	3-year-olds				4-year-olds			
	Preschool Coefficient				Preschool Coefficient			
	1993 NHES		2007 NHES		1993 NHES		2007 NHES	
<u>Child can:</u>								
Identify all colors	0.164*	(0.088)	0.408***	(0.136)	0.345***	(0.098)	0.251	(0.159)
Recognize all letters of alphabet	0.261***	(0.088)	0.502***	(0.120)	0.120	(0.077)	0.280**	(0.127)
Count beyond 20	0.063	(0.117)	0.266*	(0.148)	0.231***	(0.079)	0.499***	(0.130)
Write name	0.334***	(0.082)	0.472***	(0.112)	0.434***	(0.076)	0.771***	(0.137)
Read written words	0.696***	(0.231)	0.329	(0.357)	0.314**	(0.157)	0.422*	(0.220)
Read story books on own	0.183	(0.129)	0.044	(0.151)	0.211**	(0.104)	0.337**	(0.150)
Child fidgets a lot	0.024	(0.084)	-0.257**	(0.118)	-0.020	(0.076)	-0.174	(0.135)

Sources: NHES1993, NHES2007. *Notes:* Sample weights applied. Standard errors in parentheses. Coefficient for preschool is reported for separate probit equations; Tobit equation used for hours child watches TV per week. Sample sizes vary. Each specification controls for: race (3 dummy variables); gender; child health (1); disability (1); single parent; mother's education (3); mother's work status (2); mother's first language not English; household size; number of children in household age under 9/10; household income. Includes controls for parental effort (see Table 2). *** p<0.01, ** p<0.05, * p<0.1.

Appendix: Table 2
Effect of Preschool on Child Development and Parental Effort
Propensity score matching analysis

	Preschool Coefficient 2007 NHES, 4-year-olds					
	Weighted adjusted PSM		ATE		ATT	
<u>Child can:</u>						
Identify all colors	0.155	(0.146)	0.267**	(0.127)	0.214*	(0.130)
Recognize all letters of alphabet	0.194	(0.138)	0.252**	(0.107)	0.241**	(0.113)
Count beyond 20	0.535***	(0.134)	0.381***	(0.115)	0.354***	(0.121)
Write name	0.852***	(0.136)	0.731***	(0.108)	0.698***	(0.114)
Read written words	0.646***	(0.193)	0.547***	(0.177)	0.534***	(0.178)
Read story books on own	0.449***	(0.153)	0.295**	(0.128)	0.262*	(0.134)
Child fidgets a lot	-0.511***	(0.145)	-0.271***	(0.104)	-0.276**	(0.110)
<u>In last week, did someone do following with child:</u>						
Tell story	-0.027	(0.131)	0.040	(0.111)	0.052	(0.117)
Teach letters	0.143	(0.149)	0.266**	(0.121)	0.221*	(0.127)
Teach songs or music	-0.257*	(0.145)	-0.115	(0.107)	-0.112	(0.112)
Arts and crafts	0.003	(0.149)	0.059	(0.136)	0.024	(0.143)
Visit a library (in last month)	-0.067	(0.133)	-0.004	(0.099)	-0.042	(0.104)
Go to a museum (in last month)	0.007	(0.151)	0.184	(0.112)	0.180	(0.118)
Hours child watches TV per week	-0.235	(0.166)	-0.317***	(0.116)	-0.326***	(0.118)
Read to child every day	-0.097	(0.123)	0.027	(0.101)	-0.013	(0.107)

Sources: NHES1993, NHES2007. *Notes:* Standard errors in parentheses. Coefficient for preschool is reported for separate probit equations; Tobit equation used for hours child watches TV per week. Sample sizes vary across specifications, with minima of 1,019. Each specification controls for: race (3 dummy variables); gender; child health (1); disability (1); single parent; mother's education (3); mother's work status (2); mother's first language not English; household size; number of children in household age under 9/10; household income; and preschool attendance. *** p<0.01, ** p<0.05, * p<0.1.

Appendix: Table 3
Effect of Preschool on School readiness
Propensity score matching analysis

	Preschool Coefficient					
	2007 NHES, 4-year-olds					
	Weighted adjusted PSM		ATE		ATT	
<u>It is essential that to be ready for kindergarten child:</u>						
Knows the letters of the alphabet	-0.167	(0.124)	0.059	(0.100)	0.049	(0.105)
Is able to use pencils and paint brushes	-0.009	(0.131)	0.008	(0.099)	0.027	(0.105)
Can count to 20 or more	-0.237*	(0.127)	-0.076	(0.101)	-0.091	(0.107)
Takes turns and shares	-0.177	(0.128)	-0.050	(0.105)	-0.047	(0.110)
Child will delay kindergarten	-0.475***	(0.134)	-0.224**	(0.103)	-0.243**	(0.108)
Child will delay kindergarten ^a	-0.055	(0.126)	-0.228**	(0.104)	-0.246**	(0.109)

Sources: NHES1993, NHES2007. *Notes:* Standard errors in parentheses. Coefficient for preschool is reported for separate probit equations. Sample sizes vary. Each specification controls for: race (3 dummy variables); gender; child health (1); disability (1); single parent; mother's education (3); mother's work status (2); mother's first language not English; household size; number of children in household age under 9/10; household income; and preschool attendance. Child will delay kindergarten based on age cut-off. ^a Includes controls for parental expectations about kindergarten. *** p<0.01, ** p<0.05, * p<0.1

Appendix Table 4
Effect of Preschool on Child Development and Parental Effort
Sample: children's preschool participation most likely to have changed over time

	3-year-olds		4-year-olds	
	Preschool Coefficient		Preschool Coefficient	
	2007 NHES		2007 NHES	
<u>Child can:</u>				
Identify all colors	0.471**	(0.211)	0.564**	(0.285)
Recognize all letters of alphabet	0.744***	(0.196)	0.209	(0.176)
Count beyond 20	-0.034	(0.244)	0.512***	(0.177)
Write name	0.274	(0.188)	1.182***	(0.212)
Read written words	0.610	(0.407)	0.712***	(0.251)
Read story books on own	-0.138	(0.240)	0.452***	(0.167)
Child fidgets a lot	-0.369*	(0.198)	-0.363*	(0.211)
<u>In last week, did someone do following with child:</u>				
Tell story	-0.228	(0.197)	0.283	(0.206)
Teach letters	0.535**	(0.241)	0.410*	(0.230)
Teach songs or music	-0.222	(0.213)	0.125	(0.201)
Arts and crafts	0.294	(0.224)	0.402*	(0.243)
Visit a library (in last month)	0.206	(0.193)	0.144	(0.176)
Go to a museum (in last month)	0.434**	(0.182)	0.415*	(0.226)
Hours child watches TV per week	-0.145	(0.213)	-0.405**	(0.206)
Read to child every day	0.350**	(0.171)	-0.074	(0.184)

Sources: NHES1993, NHES2007. *Notes:* Sample weights applied. Standard errors in parentheses. Coefficient for preschool is reported for separate probit equations; Tobit equation used for hours child watches TV per week. Sample sizes vary across specifications, with minima of 536 (3-year-olds) and 552 (4-year-olds). Each specification controls for: race (3 dummy variables); gender; child health (1); disability (1); single parent; mother's education (3); mother's work status (2); mother's first language not English; household size; number of children in household age under 9/10; household income; and preschool attendance. *** p<0.01, ** p<0.05, * p<0.1.

Appendix Table 5
Effect of Preschool on School readiness
Sample: children's preschool participation most likely to have changed over time

	3-year-olds		4-year-olds	
	Preschool Coefficient		Preschool Coefficient	
	2007 NHES		2007 NHES	
<u>It is essential that to be ready for kindergarten child:</u>				
Knows the letters of the alphabet	-0.131	(0.173)	0.217	(0.192)
Is able to use pencils and paint brushes	-0.123	(0.168)	0.093	(0.186)
Can count to 20 or more	-0.147	(0.173)	0.198	(0.189)
Takes turns and shares	0.207	(0.170)	0.123	(0.180)
Child will delay kindergarten	-0.359*	(0.186)	-0.308*	(0.171)
Child will delay kindergarten ^a	-0.380**	(0.188)	-0.299*	(0.168)

Sources: NHES1993, NHES2007. *Notes:* Sample weights applied. Standard errors in parentheses. Coefficient for preschool is reported for separate probit equations. Sample sizes vary. Each specification controls for: race (3 dummy variables); gender; child health (1); disability (1); single parent; mother's education (3); mother's work status (2); first mother's language not English; household size; number of children in household age under 9/10; household income; and preschool attendance. Child will delay kindergarten based on age cut-off. ^a Includes controls for parental expectations about kindergarten. *** p<0.01, ** p<0.05, * p<0.1