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CELEBRATING A DECADE OF PROGRESS
IN IMPROVING THE LIVES OF CHILDREN,
YOUTH AND FAMILIES

Playing Catch-Up:

How Children Born to Teen Mothers Fare

By Elizabeth Terry-Humen, M.P.P., Jennifer Manlove, Ph.D.,
and Kristin A. Moore, Ph.D.

JANUARY 2005

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Summary

The problems that teen mothers face are well documented. Teen mothers are more likely than other young women to drop out of school, remain unmarried and become single parents, and to live in poverty and rely on public assistance. To be sure, many of these factors reflect disadvantages that existed *before* these teens became mothers. Still, teen parenthood seems to perpetuate many of these burdens. It is also well documented that the children of these young mothers face adverse consequences as well. In fact, research suggests that the costs of teen motherhood are *primarily* borne by the children of these young mothers.

Using recently available nationally representative data on kindergarteners from the late 1990s, this paper explores the complex relationship between the age at which a woman has a child and how her child fares. Specifically, this paper addresses two primary questions:

- What is the magnitude of the differences on measures of development between children born to teen mothers aged 17 and younger and children born to older women?
- Do differences between the kindergarten children remain after taking into account child characteristics of age, race/ethnicity, birth weight, disability, and gender; mother and

household characteristics of marital status, family structure, family socioeconomic status, and home language of the child; and mother's background characteristics including educational attainment of the child's grandmother, and whether the child's mother chose where to live based on the location of the child's kindergarten school?

It is also important to note that it is not possible to measure the *precise* and *full* effect of maternal age on child development. The authors carefully use multivariate statistical analyses to control for various confounding factors, although they were unable to take into account other unmeasured factors, such as differences in individual aspirations or motivations.

Previous Research and What This Analysis Contributes

Previous studies have reported that children of younger mothers score lower on cognitive measures—such as vocabulary and math skills and behavioral measures such as problem behaviors—than do children of older mothers. The research presented here builds on previous research in several important ways:

- Due to the availability of new data (Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999, or ECLS-K), the paper provides a more current examination of the relationship of early childbearing to selected measures of child development. Previous researchers have focused primarily on children born in the 1970s and 1980s.
- The ECLS-K data examine children who all entered kindergarten in 1998, but whose mothers were of varying ages.
- The ECLS-K data provide information on a variety of measures of child well-being, including cognition and knowledge, language and communication skills, approaches to learning, emotional well-being and social skills, and physical well-being and motor development.

Results

Differences in child, family, and mother's background characteristics by age of mother. In general, children born to the youngest mothers (aged 17 and younger) were more likely to be from a racial or ethnic minority group than children born to older mothers. Only 12 percent of mothers aged 17 and younger were married, compared with 49 percent of those aged 20-21, 60 percent of those aged 22-24, and 84 percent of those aged 25-29. The likelihood of a child living with both biological parents at kindergarten entry increased with maternal age as well—only one-quarter of kindergarten children born to mothers aged 17 and younger lived with two parents, compared with 40 percent of children born to mothers aged 18-19, and 82 percent of children born to mothers aged 25-29. Perhaps because of differences in marital status, children born to teen mothers had families with lower socioeconomic status (including lower income and education) than other children.

Differences among children by age of mother at child's first birth. Kindergarten children studied showed differences in five areas: 1) cognition

and knowledge, 2) language and communication skills, 3) approaches to learning, 4) emotional well-being and social skills, and 5) physical well-being and motor development (see chart on pages 4-5).

Cognition and knowledge. *Before controlling for background characteristics*, children born to mothers aged 17 and younger performed significantly worse on math, reading, and general knowledge tests, and teacher assessments than children born to mothers aged 20 and older. On the majority of these measures, children born to mothers aged 18-19 were not significantly better off than children born to mothers aged 17 and younger. *After controlling for background characteristics*, children of mothers aged 17 and younger had lower general knowledge scores compared with children of mothers aged 20-21. Children of the youngest mothers also had significantly lower test and assessment scores than children of mothers aged 22-29, suggesting that as maternal age at birth increases, so do children's cognition and knowledge levels by the time they reach kindergarten. Children born to mothers aged 18-19 did not perform better on any measures of cognition or knowledge than children born to mothers aged 17 and younger.

Language and communication. Overall, language and communication skills in children improve with maternal age at birth. *Before controlling for background characteristics*, children of the youngest mothers scored lower on five out of six teacher and direct assessments than children of mothers aged 20-21 and scored lower on all six assessments compared to children of mothers aged 22-29. *After controlling for background characteristics*, these differences in outcomes were less pronounced. Children of mothers aged 17 and younger were less likely to read simple books independently and to demonstrate early writing ability than children of mothers aged 20-21 and were less likely to easily name all the letters of the alphabet, read simple books independently, and to understand the "conventions of print" (for example, finding the end of a story) than children of mothers aged 22-24. Even after controlling for back-

ground differences, however, children of mothers aged 17 and younger continued to perform lower on all six language and communication assessments than children of mothers 25 to 29 years old. Once again, the children of mothers aged 18-19 did not fare better than those born to the youngest mothers.

Approaches to learning. *Before controlling for background characteristics*, children born to mothers aged 17 and younger scored lower than all other children except those born to mothers aged 18-19 on measures of approaches to learning (such as eagerness to learn, creativity, task persistence, concentration, and responsibility). *When controlling for background characteristics*, however, these differences in children's approaches to learning only remained when compared to children born to mothers aged 25-29.

Social skills and emotional well-being (negative and positive behavior). *Before controlling for background characteristics*, children of mothers aged 17 and younger were *more* likely than those born to mothers aged 20-21 to be impulsive or overactive and to suffer from anxiety, loneliness, low self-esteem, or sadness. In addition, they were more likely to argue, fight, and get angry than children of mothers aged 22 and older. Children of mothers aged 17 and younger were less likely to exercise self-control and demonstrate positive interpersonal skills than children of mothers aged 20 and older. Children of mothers aged 18-19 did not differ significantly from children of the youngest mothers. *After controlling for maternal and child characteristics*, children of mothers aged 17 and younger only demonstrated lower interpersonal skills than children born to mothers aged 25-29. Interestingly, children of young mothers scored *higher* on measures of social interaction than children of mothers aged 25-29.

Physical well-being and motor development.

Before controlling for background characteristics, children born to mothers aged 17 and younger had fewer fine motor skills than children of mothers aged 20 and older and lower ratings of overall health than children of mothers aged 22-29. Children born to mothers aged 18-19 scored similarly to children of the youngest mothers. *After controlling for background characteristics*, children of the youngest mothers performed *higher* on assessments of gross motor skills than children of mothers aged 20-21 and higher on assessments of composite motor skills than children of mothers aged 18-19.

In Sum

Without controlling for background characteristics, children born to mothers aged 17 and younger began kindergarten with lower levels of school readiness—including lower math and reading scores, language and communication skills, social skills and physical and emotional well-being—than older mothers. *When controlling for background characteristics*, such as mother's marital status, family structure, and family socioeconomic status, the effects of the mother's age diminished but remained important. Children born to mothers aged 18-19 did not perform much better on most measures than children born to mothers aged 17 and younger. The children born to mothers in their 20s clearly outperformed those whose mothers were still teenagers at time of birth, and the most consistent and pronounced differences were observed when comparing children born to mothers aged 17 and younger to those children born to mothers aged 22-29. This research suggests that efforts to improve child development should strongly encourage teens to delay childbearing past their teen years altogether and should be accompanied by encouragement to pursue education, employment, and marriage prior to parenthood.

Summary Comparison Chart

Measures that children born to mothers aged 17 and younger perform poorly on compared to children born to older mothers.

Mothers age	Age 18-19	Age 20-21	Age 22-24	Age 25-29
Cognition and Knowledge				
<i>Test Scoresⁱ</i>				
Reading		▲	■	■
Math		▲	■	■
General knowledge	▲	■	■	■
<i>Child Assessmentsⁱⁱ</i>				
Reading-letter recognition		▲	■	■
Reading-beginning sounds		▲	■	■
Math-count, number, shape		▲	■	■
Math-relative size		▲	■	■
Language and Communication Skills^v				
<i>Teacher Assessments</i>				
Understands and interprets a story			▲	■
Easily names all letters of alphabet		▲	■	■
Reads simple books independently		■	■	■
Demonstrates early writing behavior		■	▲	■
Demonstrates an understanding of some of the conventions of print		▲	▲	■
<i>Direct Assessment</i>				
Understands conventions of print ⁱⁱⁱ		▲	■	■
Approaches to Learning^{iv}				
Approaches to learning		▲	▲	■
Emotional Well-Being & Social Skills^v				
<i>Negative Behaviors</i>				
Impulsive/overactive scale		▲	▲	▲
Externalizing problem behavior			▲	▲
Internalizing problem behavior		▲		▲
Sad/lonely scale				
<i>Positive Behaviors</i>				
Self-control scale, parent report ^{vi}		▲	▲	▲
Self-control scale, teacher report ^{vii}		▲	▲	▲
Social interaction scale ^{viii}				*
Interpersonal skills ^{ix}		▲	▲	■
Physical Well-Being and Motor Development^x				
Fine motor skills		▲	▲	▲
Gross motor skills		*		
Composite motor skills	*			▲
Overall health rating of child			▲	▲

Chart Key:

■ = statistically significant differences in multivariate models (with controls) ($p < .05$)

▲ = statistically significant differences in bivariate models (without controls) ($p < .05$)

* = children of young mothers fared better

Blank cells = no differences observed

Readers should note that boxes marked as statistically significant in multivariate models were also statistically significant in bivariate models.

For more details on this summary chart, please see Tables 2-6 in the body of the paper.

- i Parent reported
- ii Direct assessment report by trained observer
- iii Three skills were assessed while the child looked at an illustrated story—knowing that reading goes from left to right; ability to go to the beginning of the next line after a line ends; and finding the end of the story
- iv Teacher report of six items, attentiveness, task persistence, eagerness to learn, learning independence, flexibility, and organization
- v Parent and teacher reported
- vi Parent report of five items: frequency of child fights, argues, throws tantrums, gets angry, and controls temper
- vii Teacher report of four items: respecting property rights of others, controlling temper, accepting peer ideas for group activities, responding appropriately to peer pressure
- viii Parent report of three items: ease in joining play, ability to make and keep friends, and positively interacting with peers
- ix Teacher report of five items: skill in forming and maintaining friendships, getting along with people who are different, comforting or helping other children, expressing feelings, ideas, and opinions in positive ways, showing sensitivity to the feelings of others
- x Direct assessment and parent report

Glossary

Controls = Taking into account child characteristics of age, race/ethnicity, birth weight, disability, and gender; mother and household characteristics of marital status, family structure, family socioeconomic status, and home language of the child; and mother's background characteristics including educational attainment of the child's grandmother, and whether the child's mother chose where to live based on the location of the child's kindergarten school.

Multivariate = Having more than two variables

Bivariate = Having two variables



Introduction

Despite a 33 percent decline in the birth rate to 15 to 19-year-olds between 1991 and 2003, more than 400,000 children are born to teen mothers in the United States each year (Hamilton, Martin & Sutton, 2004). The U.S. has a significantly higher adolescent birth rate than such countries as England, Italy, Canada, and Japan. (Abma, Martinez, Mosher & Dawson, 2004). Moreover, two out of three births to teen mothers are unintended (either mistimed or unwanted) (Brown & Eisenberg, 1995; Henshaw, 1998; Martin et al., 2003), and the vast majority of teen births occur outside of marriage (89 percent of births to 15 to 17-year olds and 76 percent of births to 18 to 19-year olds) (Martin et al., 2003). Children born to unmarried mothers are more likely to grow up with only one parent and to experience multiple living arrangements than children born to married parents (Aquilino, 1996; Bumpass & Lu, 2000).

The negative consequences associated with becoming a teen mother are well documented. Teen mothers are more likely than other young women to drop out of school, to remain unmarried and become single parents, and to live in poverty and rely on public assistance (Maynard, 1997; Moore et al., 1993). Although many of these factors reflect disadvantages that existed *before* these

teens became mothers (Ryan, Manlove, & Moore, 2004, Upchurch, 1990), teen parenthood serves to perpetuate and often exacerbate them. Moreover, the consequences of teen childbearing are not limited to the teens themselves—the children of these young mothers also are affected. Indeed, an extensive study on the effects of adolescent childbearing found that the costs (defined in this study as the costs of teen childbearing due to school dropout, health coverage, earning loss, incarceration, and a few other measures) of teen motherhood are borne *primarily* by the children of these young mothers (and then by the mothers, the government and taxpayers, and minimally by the fathers) (Maynard, 1997).

Expanding on prior research, this paper explores the complex relationship between the age at which a woman has a child and how her child fares using recently available data on a group of kindergarteners from the late 1990s. More specifically, this paper addresses two primary questions:

- What is the magnitude of the differences between children born to teen mothers aged 17 and younger and children born to older women (divided into the following age groups in this paper: 18 to 19, 20 to 21, 22 to 24, and 25 to

29) on several outcomes measured upon starting kindergarten?

- Do differences by age of mother remain after taking account of (that is, “controlling” for) characteristics of the teen mother and her child, such as mother’s marital status, family structure and family socioeconomic status (SES)?

Readers should note that while multivariate statistical analyses are used to control for measured characteristics of teen mothers and children that may be associated with age at birth, *unmeasured* factors, such as differences in a mother’s aspirations, motivation or maternal cognitive ability, may be associated with both the likelihood that a woman has a birth in her teens and with poorer child outcomes.

Key Findings

As described in more detail in the following pages, some key findings from the report include:

- Without controlling for background characteristics, children born to teen mothers begin kindergarten with lower levels of school readiness (including lower math and reading scores, language and communication skills, social skills and physical and social well-being), compared to children born to women in their twenties. Of 26 measures of kindergarten readiness across multiple domains, children born to mothers aged 17 and younger scored lower on 19 measures of school readiness compared with children born to mothers aged 20 to 21, scored lower on 21 measures compared with children born to mothers aged 22 to 24, and scored lower on 23 measures compared to children of mothers aged 25 to 29.
- When controlling for other background characteristics, the effect of the mother’s age diminishes but remains important. Of 26 separate measures of kindergarten readiness, the children of mothers aged 17 and younger fared worse on 3 measures compared to mothers aged 20-21, 10

measures compared to mothers aged 22-24, and 15 measures when compared to mothers aged 25-29.

- Children born to 18 to 19 year olds did not fare much better on most measures than children born to the youngest teens aged 17 and younger. Without controlling for background characteristics, children born to teen mothers aged 17 and younger scored worse on only 1 of 26 measures of school readiness compared with children born to mothers aged 18 to 19. After controlling for other background characteristics, children of teen mothers aged 18 to 19 scored better than children of mothers aged 17 or younger on only one measure—composite motor skills.

Research to Date

Cognitive and Academic Measures

Previous studies have reported that children of younger mothers perform worse on cognitive measures, such as vocabulary and math skills, than children of older mothers (Hofferth & Reid, 2002; Levine, Pollack, & Comfort, 2001; Moore, Morrison, & Greene, 1997; Moore & Snyder, 1991; Turley, 2003). After controlling for the teens’ characteristics before they became mothers, younger age at first birth was found to be associated with 1) lower vocabulary test scores among black and Hispanic 3 to 7-year-old children (Moore & Snyder, 1991); 2) lower scores on math, reading, and vocabulary tests among 3 to 14-year-old children (Levine et al., 2001); and 3) lower math and reading test scores among 4 to 14-year-old children (Moore et al., 1997). Possible explanations for these disparities include the fact that teen mothers themselves perform worse on such tests; that they provide less enriching home activities for their children, such as family activities and reading; and that they tend to have more children than women who delay childbearing until they are older, giving them less time to devote to each child (Levine et al., 2001).

Recent research has attempted to better explain differences in backgrounds of children born to teen mothers compared with older mothers. One set of researchers suggest that historical trends in achievement test scores may explain, in part, poorer outcomes among children of teen mothers (Hofferth & Reid, 2002).¹ Hofferth & Reid (2002) found that controlling for the historical time periods in which children aged 12 and younger in a longitudinal survey were born explained away differences between children of teen mothers and children of older mothers on three out of four reading and math achievement tests. Another researcher, Turley (2003), compared child outcomes of children born to families in which one sister had a baby in her teens and another had a baby in her twenties. Turley (2003) found, on average, lower math, reading, and vocabulary test scores among children of teen mothers compared with children of the older sisters. However, after controlling for the mother's family of origin, only reading tests were lower among children of teen mothers.

Behavioral measures

Previous research on behavioral factors has produced mixed findings. Some indicate higher rates of behavioral problems among children born to teen mothers when compared with children born to older mothers (Hofferth & Reid, 2002; Levine et al., 2001; Turley, 2003) and some do not (Moore et al., 1997). After controlling for maternal characteristics and year of birth, Hofferth & Reid (2002) found that children of teen mothers had more behavioral problems than children born to mothers aged 20 and older. Levine et al. found higher levels of fighting among children born to mothers aged 18 and younger compared with mothers aged 22 and older. However, Turley found no significant differences in behavioral problems after controlling for background characteristics of children born to sisters, and Moore, et al. found

fewer behavioral problems among children of mothers aged 17 and younger, compared to those with mothers aged 20-21. Future research is needed to help clarify this issue.

Health Issues

Only a few studies have compared the health status of children of teen mothers with children of older mothers. For example, Wolfe & Perozek (1997) found that teen mothers were less likely to report their children (aged 13 and younger) were in "excellent health" and were more likely to report that their children were in "fair/poor" health than children of mothers aged 22 and older. However, Moore, Morrison & Greene (1997) found no differences by maternal age on various disability measures (such as learning disability, hyperactivity, or serious emotional disturbance) among children aged 4 to 14, maternal-reported health status among children aged 12 to 16, or self-reported health status among children aged 18 to 22 even before adding controls. This paper builds on prior research by further examining developmental differences between young children born to teen mothers and those born to older mothers.

This Paper's Contributions

This paper supplements existing research on the consequences of teen childbearing in several important ways. First—using data from the Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999 (ECLS-K), a large, nationally representative sample of young children born in the 1990s and who entered kindergarten in the late 1990s—the paper provides a more current examination of the effect of early childbearing. Because these data are newly available, previous researchers had focused primarily on children born in the 1970s and 1980s (Hofferth & Reid, 2002; Levine et al., 2001; Moore et al., 1997; Moore & Snyder,

1 For example, children born to teen mothers in the National Longitudinal Survey of Youth 1979 (NLSY79) data were primarily born in the 1970s and into the early 1980s. Researchers used these data to compare outcomes among children of teen mothers with outcomes among children born to mothers in their thirties who were born in the late 1980s through the 1990s (Hofferth & Reid, 2002; Levine et al., 2001; Moore et al., 1997; Moore & Snyder, 1991; Turley, 2003).

1991; Turley, 2003). Second, the ECLS-K sample are all children who entered kindergarten in 1998. This allows comparisons between children born to teen mothers and those born to older mothers all of whom are part of the same cohort—an improvement over previous research based on samples of mothers that compared children born in very different historical time periods (Hofferth & Reid, 2002). Third, the ECLS-K data provide a large sample of children, allowing for comparisons of children born to mothers of various ages. Finally, the ECLS-K contains data on many areas of child development, as described below.

Data

The ECLS-K, directed by the National Center for Education Statistics, is a nationally representative longitudinal study of children in the United States who were in kindergarten during the 1998-1999 school year (Westat et al., 2001). The study was designed to help understand how children's early experiences affect subsequent performance in grade school. It includes data from several sources, including the kindergarteners themselves, their parents, teachers, and school administrators. Students were surveyed initially during the fall of their kindergarten year, with follow-up interviews conducted in the first, third, and fifth grades. Information is available on several school readiness measures at kindergarten entry, and, as the children progress through school, on measures of cognition and knowledge, social and emotional development, physical health, communication, and approaches to learning. The survey includes multiple topics regarding the child and his or her family, school, and community. In all, 21,399 interviews were completed in 1998, and data currently are available through the third grade year.

Sample

The ECLS-K includes 17,219 students who entered kindergarten for the first time in 1998. For this paper, the sample chosen was based on the age at which the mother first gave birth, the age of the child being studied, and whether there were older biological siblings in the home. The final sample studied was limited to kindergarteners who were living in a household with their biological mother (n=16,179) and to first-born children (to allow for comparisons between children of the same parity). The final sample includes 6,228 first-born, first-time kindergarteners who were living with their biological mothers.² Analyses were conducted for children born to mothers of all ages, but the paper's tables are structured to compare outcomes between children born to the youngest teen mothers (defined here as aged 17 and younger) and children born to mothers aged 18 to 19, 20 to 21, 22 to 24, and 25 to 29 respectively. (Comparisons on outcomes of children born to teen mothers and mothers age 30 or older are not shown due to this paper's focus on potential improvements in school readiness outcomes that might occur by delaying childbearing from the teen years and into the twenties—a more realistic goal for adolescents than delaying to age 30 or beyond).³

Measures

Dependent variables

Several dependent variables were used to examine child development at kindergarten-entry in areas of cognition and knowledge, language and communication skills, approaches to learning, emotional well-being and social skills, and physical health and well-being.

- 2 In order to create a sample of first-born children, we began with a sample of 6,991 first time kindergarteners living with biological mothers who did not report older biological siblings in the household. From this sample, we removed 763 children where it appeared that the focal child was not the mother's first-born child because the difference between the mother's age at first birth and her current age was more than a year off of the focal child's age (our assumption was that mother's age at first birth plus child's age should be within one year of her current age) for a final sample size of 6,228.
- 3 Comparisons on outcomes of children born to teen mothers and children born to mothers aged 30 or older are not shown due to this paper's focus on potential improvements in school readiness outcomes that might occur by delaying childbearing from the teen years and into the twenties – a more realistic goal for adolescents than delaying to age 30 or beyond.

Cognition and knowledge. These variables reflect the child's cognition and knowledge at kindergarten entry based on language and literacy, mathematical thinking, and general knowledge test scores from direct assessments. For reading, math, and general knowledge, children were tested in a two-stage process with the first stage determining the level the child would be placed in for second stage testing. In each testing stage, children were asked multiple questions (20 for reading, 16 for math, and 12 for general knowledge), and Item Response Theory (IRT) scale scores were used to assess their responses.⁴ Thus, for the reading scores, although each child only answered 20 questions, she or he could receive an IRT scale score ranging from 0 to 72. IRT scale scores ranged from 0 to 64 for math and 0 to 52 for general knowledge (Westat et al., 2001). Children also were directly assessed on two reading skills (letter recognition and beginning sounds) and two math concepts (counting, numbers and shapes and relative size of objects). Children were assessed for proficiency in the skills and concepts using a 0-1 score (1=child was proficient in skill).

Language and communication skills. Teachers assessed their students on five language and communication skills in kindergarten including: understanding and interpreting a story, easily naming all the letters of the alphabet, reading simple books independently, demonstrating early writing behaviors, and understanding of some of the conventions of print. Children were assessed on a five-point scale (1=Not yet starting skill to 5=Proficient).

Additionally, children were directly assessed for how well they knew "conventions of print"—whether they understood that reading goes from left to right; whether they could go to the beginning of the next line when a line ended; and if they could find the end of the story. A child received a

point for each skill demonstrated (Westat et al., 2001).

Approaches to learning. Kindergarteners' approaches to learning were assessed using the Social Rating Scale (SRS).⁵ The SRS asks the child's teacher to assess how often the kindergarten exhibits the following behaviors (1=Never exhibits behavior to 4=Very often exhibits behavior): eagerness to learn, interest in a variety of things, creativity, task persistence, concentration, and responsibility.

Emotional well-being and social skills. Also included were measures from SRS on the emotional well-being and social skills of kindergarten students. Measures include negative and positive behaviors. For each behavior, children were rated on a four-point scale ranging from 1 (never exhibits behavior) to 4 (very often exhibits behavior). The first negative behavior scale consists of two items that measure the child's impulsiveness and over-activeness and was taken from the parent survey. Another scale measures "externalizing" problem behaviors and was taken from a survey in which teachers rate the frequency with which the child argues, fights, gets angry, acts impulsively, and disturbs ongoing activities. Teachers also rated the frequency with which their student exhibits "internalizing" problem behaviors including anxiety, loneliness, low self-esteem, and sadness. For the fourth negative behavior, parents rated their child on a "sad and lonely scale" which addressed whether their child had problems with being accepted and liked by others, sadness, loneliness, and low self-esteem.

Four positive behaviors are also rated on a four-point scale, from 1 (never exhibits behavior) to 4 (very often exhibits behavior). The parent self-control scale includes the frequency with which their child fights, argues, throws tantrums, gets

4 IRTs take into consideration the child's level of testing, the number of questions the child completes, the number of questions the child answers correctly, and the pattern of correct answers. This information is then used to determine an overall score (Westat et al., 2001).

5 Items making up the SRS come from the Social Skills Rating Scale (Gresham and Elliott, 1990) which is copyright protected and not available for review.

angry, and controls temper, and was reversed to be a positive scale. Teachers also rated their students on self-control (respecting the property rights of others, controlling their temper, accepting peer ideas for group activities, and responding appropriately to peer pressure). Parents rated their children on a social interaction scale measuring the ease with which their child joins in play, ability to make and keep friends, and positively interacting with peers. The fourth positive behavior was measured by teachers who assessed their student's interpersonal skills including skills in forming and maintaining friendships, getting along with people who are different, comforting or helping other children, expressing feelings, ideas, and opinions in positive ways, and showing sensitivity to the feelings of others.

Physical health and well-being. The final set of dependent variables includes direct assessments of the child. The child's fine and gross motor skills were measured by a trained assessor. Fine motor skills include seven tasks: building a gate, drawing a person, and copying five simple figures. Four gross motor skills also were tested: balancing, hopping, skipping, and walking backwards. A single measure that includes a combination of the child's fine and gross motor skills was also included, and the child could receive up to 17 points for completing all the tasks and having all the skills. The final measure is taken from the parent survey where respondents were asked to rate their child's overall health on a five-point scale (1=poor to 5=excellent).

Control variables

Several social and demographic variables are included in the analyses as controls. These include characteristics of the child such as race and ethnicity (non-Hispanic white, non-Hispanic black, Hispanic and other); age (in months and years);

gender; whether the child was born low birth-weight (less than 5.5 pounds); whether the child has a diagnosed disability such as a learning disability, activity problem, mobility problem, speech problem, hearing difficulty, or vision difficulty; or prior to this school year, whether the child received therapy or took part in a program for children with disabilities. Maternal and household characteristics include: mother's marital status at the child's birth; family structure at kindergarten entry (who the child lived with); household socioeconomic status (SES) at kindergarten entry including household income, mother and father's education level, and mother and father's occupation; and whether English is the primary language spoken at home.⁶ The educational attainment of the child's grandmother—ranging from 1 (first grade) to 22 (professional degree)—also is included. Finally, whether the kindergartener's parent chose the neighborhood in which they lived based on the school their child would attend is also measured.

Methods

As noted previously, this paper examines:

- The magnitude of the differences between children born to teens aged 17 and younger and children born to older women (aged 18 to 19, 20 to 21, 22 to 24, and 25 to 29) on several specific factors upon starting kindergarten, and
- Whether differences by age of the mother remain after controlling for characteristics of the teen mother and her child, such as mother's marital status, family structure and family socioeconomic status (SES)

Bivariate and multivariate analyses were conducted to help answer these questions, and estimates are based on two types of models. The first set of models assessed differences in school readiness measures of children born to mothers aged 17

6 Some of the child and family controls used in these models (such as low birthweight, disability, family structure and SES measured at kindergarten entry) represent strong controls that could measure, in part, consequences of early childbearing. However, analyses removing several of these variables did not substantially change the analysis results.

and younger and children born to older mothers without taking into account mother's background characteristics or child characteristics. The second set of models examined differences in child outcomes taking into account maternal and child background characteristics. Children born to mothers aged 17 and younger allows an examination of the experiences of school-aged mothers, in particular. Outcomes for children born to mothers aged 18 to 19 are compared with those born to mothers aged 17 and younger in order to see whether outcomes differ by age of teen mother. Analyses also compare children of very young teen mothers with children born to women who delayed childbearing until their twenties.⁷

Results

Differences in child, family, and mother's background characteristics by age of mother

Table 1 shows child, family, household and maternal background characteristics of children in the sample by their mother's age at first birth.

In general, children born to the youngest mothers (aged 17 and younger) were more likely to be a racial or ethnic minority and to have been born low birthweight than children born to older mothers. Children born to mothers aged 17 and younger were least likely to be non-Hispanic white (38 percent compared with 45 percent of 18 to 19-year-old mothers, 52 percent of 20 to 21-year-old mothers, 58 percent of 22 to 24-year-old mothers, and 73 percent of 25 to 29-year-old mothers

respectively). Conversely, the children born to the youngest mothers were more likely to be Hispanic (27 percent) or non-Hispanic black (28 percent) than children born to older mothers (19 percent Hispanic and 13 percent black). These children were also more likely to be born low birthweight than children born to mothers aged 20 or older. Note that children born to mothers aged 18 to 19 also were more likely to be a racial or ethnic minority and to have been born low birthweight than children of mothers aged 20 and older.

The likelihood that these mothers were married when they had their first child increased dramatically with maternal age at birth. Only 12 percent of mothers aged 17 or younger were married, compared with nearly one-third (32 percent) of mothers aged 18 to 19, one-half (49 percent) aged 20 to 21, 60 percent aged 22 to 24, and 86 percent of mothers aged 25 to 29. The likelihood of a child living with both biological parents increased with maternal age as well. Only one-quarter of kindergarten children born to the mothers aged 17 and younger lived with two parents (26 percent) compared with 40 percent of children born to 18-19-year-old mothers and 82 percent of children born to mothers aged 25 to 29. Moreover, children born to the youngest mothers were in households with dramatically lower SES measured at kindergarten entry. For example, only about 10 percent of children born to mothers aged 17 or younger and 13 percent of children born to mothers aged 18 to 19 were in the two highest SES categories ("quintiles"), compared with 51 percent of children born to mothers aged 25 to 29.

7 Differences in outcomes between children of teenage mothers and those of older mothers are examined without control variables using bivariate chi-square analyses for categorical dependent variables and Generalized Linear Model analyses to test differences in means for continuous dependent variables. Using ordinary least squares (OLS) models for continuous outcomes, socio-demographic background variables are controlled in order to examine whether child outcomes differ by age of mother at first birth. Based on the multivariate results, predicted probabilities are generated to present adjusted estimates of outcomes among children of teenage mothers as compared to children of older mothers. Results from multivariate models standardize background factors and present predicted probabilities for outcomes that reflect only age at first birth. In order to control for the complex sample design of the ECLS-K, all results adjust for clustering using Stata (StataCorp, 2001). All estimates are weighted.

While this study has controlled for measured maternal and child characteristics that could potentially help explain the relationship between maternal age and child outcomes, the remaining associations between the timing of motherhood and child outcomes may still reflect other unmeasured maternal characteristics. Future analyses should incorporate more complex modeling in order to control for unmeasured background characteristics that may influence both the likelihood of becoming a teen mother (or an older first-time mother) and outcomes of the children born to them.

Table 1. Bivariate Differences in Child, Family, Household and Mother's Background Characteristics by Age of Mother at Child's Birth.

	Age of mother at first child's birth					
	Total (N=4869)	17 & younger (N=525)	18-19 (N=741)	20-21 (N=815)	22-24 (N=1000)	25-29 (N=1743)
Child Characteristics						
Age at child assessment (in years)	5.68	5.69	5.69	5.68	5.67	5.68
Race/Ethnicity			***	***	***	***
Non-Hispanic White	60.8%	37.9%	44.8%	51.8%	58.4%	72.9%
Non-Hispanic Black	13.3%	28.3%	20.8%	15.2%	13.9%	7.6%
Hispanic	18.6%	27.0%	27.0%	25.4%	20.9%	12.7%
Non-Hispanic Other	7.4%	6.8%	7.5%	7.6%	6.9%	6.9%
Born with low birth weight (<5.5 lbs)	4.4%	7.2%	5.2%	2.7%***	4.2%*	4.3%*
Child has a disability	12.4%	13.3%	12.7%	13.8%	11.4%	12.1%
Child is male	50.4%	49.1%	51.1%	52.7%	49.1%	51.6%
Family and Household Characteristics						
Mother was married at child's birth	62.6%	11.5%	32.1%***	48.6%***	60.4%***	84.4%***
Family structure at kindergarten entry			***	***	***	***
2 biological parents	64.8%	25.7%	39.9%	54.5%	62.3%	81.7%
1 biological/1 stepparent	10.5%	23.0%	19.8%	16.2%	12.2%	3.9%
1 biological parent	24.7%	51.2%	40.3%	29.3%	25.5%	14.5%
Household socioeconomic status at kindergarten entry			***	***	***	***
1st quintile	15.6%	44.7%	29.3%	20.8%	11.2%	7.1%
2nd quintile	19.4%	30.0%	33.1%	25.7%	22.8%	12.4%
3rd quintile	21.1%	15.4%	24.3%	27.4%	27.4%	19.7%
4th quintile	21.9%	8.4%	10.9%	19.9%	25.3%	28.7%
5th quintile	22.1%	1.5%	2.4%	6.2%	13.3%	32.2%
Home language of child is English	88.7%	89.3%	85.4%*	86.3%	85.8%	90.0%
Mother's Background						
Child's grandmother's educational attainment	13.05	12.34	12.43	12.56	13.10***	13.24***
Home choice affected by child's current school	28.0%	27.7%	24.9%	28.0%	25.7%	30.2%

Significance indicates difference between children born to teen mothers aged 17 and younger and all other age groups. *** p<.001 **p<.01 *p<.05 +p<.10

Differences among children by age of mother at first birth

Tables 2 through 6 present data on these children in five areas of school readiness: 1) cognition and knowledge, 2) language and communication skills, 3) approaches to learning, 4) emotional well-being and social skills, and 5) physical well-being. The information is presented by age of mother at first birth, without controlling for any variables (no controls), and after controlling for the background characteristics listed in Table 1.

Cognition and knowledge. Table 2 presents kindergarten readiness measures for seven cognition and knowledge skills based on three test scores and four assessments (two reading and two math).

Before controlling for the characteristics in Table 1, all seven cognition and knowledge outcomes showed significant average differences by age of mother. Children born to mothers aged 17 and younger had lower test scores and teacher assessments than children born to mothers aged 20 or older. These findings indicate that children of young teen mothers are already behind cognitively when they begin kindergarten. They had lower reading, math, and general knowledge test scores and lower proficiencies on both reading and math assessments than children born to mothers aged 20 or older. It is interesting to note that on four of the

seven measures, children born to mothers aged 18 to 19 were not significantly better off than children born to mothers aged 17 and younger. Still, children born to the youngest mothers had lower general knowledge test scores and marginally lower⁸ reading test scores and beginning sounds assessments than children born to mothers aged 18 to 19.

After controlling for background characteristics, children of mothers aged 17 and younger continued to differ from children of mothers aged 20 and older in several respects. Compared to children born to mothers aged 20 to 21, children of younger mothers had lower general knowledge scores (an average of .8 points lower after controls compared with 2.7 points lower *before* controls) and marginally lower reading scores (an average of .6 points lower after controls). Children of mothers aged 18 to 19 had outcomes similar to children of the youngest mothers. Differences still existed, however, in reading, math, and general knowledge test scores between children born to mothers aged 17 and younger and children born to mothers aged 22 to 24 and 25 to 29. Children of the youngest mothers also had significantly lower assessment scores than children of mothers aged 22 to 24 and 25 to 29. This suggests that, as maternal age at birth increases, so do children's cognition and knowledge levels by kindergarten entry, even after controlling for family SES, maternal marital status at birth, and current family structure.

⁸ We present marginally significant findings that have a p-value of less than .10 in our analyses because many of our child outcomes are linear and we do not feel our sample size is too large to exclude them.

Table 2. Estimates of Cognition and Knowledge and Language Development in Kindergarten by Age of Mother at Child's Birth, With and Without Controls.^{^z}

	Age of mother at first child's birth				
	17 & under (N=525)	18-19 (N=741)	20-21 (N=815)	22-24 (N=1000)	25-29 (N=1743)
Test Scores					
Reading (range = 0-72) ^C					
no controls	18.82	19.53 +	21.01***	23.06***	25.60***
with controls	21.97	21.92	22.55 +	23.59***	24.62***
Math (range = 0-64) ^C					
no controls	16.10	16.44	17.82***	19.19***	21.76***
with controls	18.87	18.53	19.15	19.69**	20.86***
General knowledge (range = 0-52) ^C					
no controls	18.35	19.50**	21.05***	22.49***	25.12***
with controls	21.37	21.62	22.15*	22.82***	24.03***
Child Assessments					
(proficiency probability score 0 to 1)					
Reading - letter recognition ^C					
no controls	0.51	0.54	0.62***	0.71***	0.82***
with controls	0.64	0.64	0.67	0.72**	0.78***
Reading - beginning sounds ^C					
no controls	0.15	0.18 +	0.23***	0.34***	0.44***
with controls	0.29	0.29	0.30	0.36***	0.40***
Math - count, number, shape ^C					
no controls	0.86	0.89	0.90**	0.93***	0.97***
with controls	0.91	0.92	0.92	0.94*	0.95***
Math - relative size ^C					
no controls	0.39	0.40	0.47***	0.56***	0.68***
with controls	0.53	0.50	0.54	0.58*	0.63***

[^] Analyses were conducted for children of mothers of all ages, but only those under age 30 are included for comparison to children of teen mothers.

^z Estimates with controls are based on predicted probabilities from multivariate models that control for all of the characteristics listed in Table 1.

A Parent Report
B Teacher Report

C Direct Assessment

Significance indicates difference between children born to teen mothers aged 17 and younger and all other age groups.
***p<.001 **p<.01 *p<.05 +p<.10

Language and Communication. Table 3 presents estimates of language and communication skills in kindergarten before and after controlling for child, family, and maternal background characteristics. Overall, these skills in children improve with increasing age of the mother at birth. The largest differences were detected between children of mothers aged 17 and younger and children of mothers aged 25 to 29. Before controlling for characteristics in Table 1, children of the youngest mothers scored lower on all five teacher and direct

assessments than children of mothers aged 20 to 21, and assessment scores for these skills improved with maternal age. It is interesting to note, however, that little difference existed between children of 18 to 19-year-old mothers and the youngest mothers, with the former scoring slightly higher on understanding of conventions of print. Overall, though, these findings indicate that, upon kindergarten entry, children of the youngest teen mothers lagged behind children born to older mothers on language and communication skills.

Table 3. Estimates of Language and Communication Skills in Kindergarten by Age of Mother at Child's Birth, With and Without Controls.^{^z}

	Age of mother at first child's birth				
	17 & under (N=525)	18-19 (N=741)	20-21 (N=815)	22-24 (N=1000)	25-29 (N=1743)
Teacher Assessments	Range: 1=Not Yet; 2=Beginning; 3=In Progress; 4=Intermediate; 5=Proficient				
Understands and interprets a story ^B					
no controls	2.67	2.74	2.82 +	2.95***	3.27***
with controls	2.95	2.95	2.96	2.99	3.18**
Easily names all letters of alphabet ^B					
no controls	2.38	2.51	2.76***	2.93***	3.38***
with controls	2.80	2.84	2.98+	3.00*	3.24***
Reads simple books independently ^B					
no controls	2.24	2.39	2.64**	2.62**	2.81***
with controls	2.38	2.51	2.73**	2.65*	2.77**
Demonstrates early writing behaviors ^B					
no controls	2.14	2.19	2.47**	2.49**	2.74***
with controls	2.34	2.35	2.58*	2.53+	2.68**
Demonstrates an understanding of some of the conventions of print ^B					
no controls	2.28	2.45	2.55*	2.61**	2.93***
with controls	2.45	2.58	2.64+	2.63 +	2.86**
Direct Assessment (0-3 skills)					
Understands conventions of print ¹					
no controls	1.32	1.48 +	1.63***	1.84***	2.12***
with controls	1.66	1.71	1.76	1.87***	2.01***

[^] Analyses were conducted for children of mothers of all ages, but only those under age 30 are included for comparison to children of teen mothers.

^z Estimates with controls are based on predicted probabilities from multivariate models that control for all of the characteristics listed in Table 1.

¹ Three skills were assessed while the child looked at an illustrated story---knowing that reading goes from left to right; ability to go to the beginning of the next line after a line ends; and finding the end of the story. The child receives 1 point for each skill.

Significance indicates differences between children born to teen mothers aged 17 and younger and all other age groups. ***p<.001 **p<.01 *p<.05 +p<.10

Differences in outcomes are less pronounced when controlling for child, family, and maternal background characteristics. Four of the five teacher reports found that language skills were significantly lower, though two were marginally significant, for children born to mothers aged 17 and younger, compared with children born to mothers aged 20 to 21. Compared to children born to mothers aged 20 to 21, children of the youngest mothers were less likely to read simple books independently and to demonstrate early writing ability. They also were marginally less likely to easily name all the letters of the alphabet and to demonstrate an understanding of some of the conventions of print.

Larger differences were found between children born to mothers aged 17 and younger and those born to mothers aged 22 and older, with the greatest differences between the youngest and oldest mothers. In addition to discrepancies in the five teacher assessments, differences also were found on the overall assessment of conventions of print, with children of teen mothers aged 17 and younger scoring lower than children born to mothers aged 22 to 24 and 25 to 29. The one outcome that

showed only marginally significant differences between 18 to 19-year-old mothers and younger mothers—understanding conventions of print—was no longer significant after controlling for background characteristics.

Approaches to Learning. Table 4 presents differences in kindergarteners' approaches to learning by mother's age. Teachers were asked to rate on a one to four point scale (1=Never exhibits behavior, 4=Very often exhibits behavior), how often their student displayed such attributes as attentiveness, task persistence, eagerness to learn, learning independence, flexibility, and organization. Before controlling for background characteristics, children born to mothers aged 17 and younger scored lower than all other children except those born to mothers aged 18 to 19. After controlling for child, family, and maternal background characteristics, however, this difference only remained when compared to children born to mothers aged 25 to 29. This suggests that family and maternal background characteristics can explain at least part of the difference in children's motivation to learn.

Table 4. Estimates of Approaches to Learning Skills in Kindergarten by Age of Mother at Child's Birth, With and Without Controls.^{^z}

Child Assessment	Age of mother at first child's birth				
	17 & younger (N=525)	18-19 (N=741)	20-21 (N=815)	22-24 (N=1000)	25-29 (N=1743)
Approaches to learning ^{B1}					
no controls	2.83	2.84	2.92 *	2.97***	3.14***
with controls	2.98	2.94	2.99	2.98	3.09*

Range: 1=Never exhibits behavior; 2=Sometimes exhibits behavior;
3=Often exhibits behavior; 4=Very often exhibits behavior

[^] Analyses were conducted for children of mothers of all ages, but only those under age 30 are included for comparison to children of teen mothers.

^z Estimates with controls are based on predicted probabilities from multi-

variate models that control for all of the characteristics listed in Table 1.

A Parent Report
B Teacher Report
C Direct Assessment

1 6 items - attentiveness; task persistence; eagerness to learn; learning independence; flexibility; and organization

Significance indicates difference between children born to teen mothers aged 17 and younger and all other age groups.
***p<.001 **p<.01 *p<.05 +p<.10

Social Skills and Emotional Well-Being. Estimates of kindergarteners' emotional well-being and social skills are presented by age of mother at first birth in Table 5. They are grouped as "negative" and "positive" behaviors and are reported both without controls and with controls. Without controls, when compared to children of mothers aged 20 to 21, children of mothers aged 17 and younger were more likely to be impulsive/overactive and exhibit internalizing problem behaviors and were less likely to exercise self-control and demonstrate positive interpersonal skills. In nearly all areas, children of mothers aged 25 or older had the lowest negative behaviors and the highest positive behaviors. Children of mothers aged 18 to 19 did not differ significantly from children of mothers aged 17 and younger on any behaviors.

After controlling for maternal and child characteristics, children of mothers aged 17 and younger did not score worse on any measures of negative

behaviors than children born to older mothers – even the oldest mothers. Regarding positive behaviors, however, two measures remained significantly different. Children of the youngest mothers had lower interpersonal skills (measured as a teacher's report of their skill in forming and maintaining friendships, getting along with people who are "different," comforting or helping other children, expressing feelings, ideas, and opinions in positive ways, and showing sensitivity to the feelings of others) than children born to mothers aged 25 to 29. However, children of the youngest mothers scored *higher* than children of mothers aged 25 to 29 and marginally higher than children of mothers aged 22 to 24 on social interaction (measured as ease in joining play; ability to make friends; and positively interacting with peers). This latter finding contrasts with those without controls, which found no significant difference in social interaction skills between children of the youngest and oldest mothers.

Table 5. Estimates of Emotional Well-Being and Social Skills in Kindergarten by Age of Mother at Child's Birth, With and Without Controls.^{^z}

Child Assessment	Age of mother at first child's birth				
	17 & under (N=525)	18-19 (N=741)	20-21 (N=815)	22-24 (N=1000)	25-29 (N=1743)
Negative Behaviors					
Range: 1=Never exhibits behavior; 2=Sometimes exhibits behavior; 3=Often exhibits behavior; 4=Very often exhibits behavior					
Impulsive/overactive scale^{A1}					
no controls	2.13	2.12	2.02*	1.98**	1.92***
with controls	1.98	2.03	1.96	1.97	1.97
Externalizing problem behaviors^{B2}					
no controls	1.76	1.74	1.70	1.63**	1.58***
with controls	1.65	1.66	1.65	1.62	1.61
Internalizing problem behavior^{B3}					
no controls	1.59	1.59	1.52*	1.54	1.50**
with controls	1.52	1.56	1.50	1.54	1.51
Sad/lonely scale^{A4}					
no controls	1.60	1.58	1.58	1.59	1.57
with controls	1.55	1.55	1.56	1.59	1.59
Positive Behaviors					
Self-control scale ^{A5}					
no controls	2.78	2.79	2.85*	2.89**	2.92***
with controls	2.85	2.83	2.88	2.89	2.90
Self-control scale ^{B6}					
no controls	2.95	2.95	3.06**	3.07***	3.16***
with controls	3.08	3.04	3.11	3.08	3.12
Social interaction scale ^{A7}					
no controls	3.36	3.35	3.36	3.38	3.35
with controls	3.44	3.41	3.40	3.38 +	3.33***
Interpersonal skills ^{B8}					
no controls	2.82	2.85	2.94**	2.95**	3.10***
with controls	2.95	2.94	3.00	2.96	3.05*

[^] Analyses were conducted for children of mothers of all ages, but only those under age 30 are included for comparison to children of teen mothers.

^z Estimates with controls are based on predicted probabilities from multivariate models that control for all of the characteristics listed in Table 1.

^A Parent Report

^B Teacher Report

¹ Direct Assessment

² 2 items - impulsivity and activity levels

³ 5 items - frequency in which child argues, fights, gets angry, acts impulsively, and disturbs ongoing activities

⁴ 4 items - anxiety, loneliness, low self-esteem, and sadness

⁵ 5 items - frequency child fights, argues, throws tantrums, gets angry, and controls temper (coded positively)

⁶ 4 items - respecting property rights of others, controlling temper, accepting peer ideas for group activities, responding appropriately to peer pressure

⁷ 3 items - ease in joining play; ability to make and keep friends, and positively interacting with peers

⁸ 5 items - skill in forming and maintaining friendships; getting along with people who are different; comforting or helping other children; expressing feelings, ideas, and opinions in positive ways; showing sensitivity to the feelings of others

Significance indicates difference between children born to teen mothers aged 17 and younger and all other age groups. ***p<.001 **p<.01 *p<.05 +p<.10

Health and Motor Development. Table 6 presents findings regarding physical health and motor development with and without controls. An analysis without controls found that children born to mothers aged 17 and younger had fewer fine motor skills than children of mothers aged 20 to 21. Children born to mothers aged 25 to 29 had the highest fine and composite motor skills and were rated the highest by their mothers on their overall health. Children born to mothers aged 18 to 19

scored similarly to children born to mothers aged 17 and younger. After controlling for maternal and child characteristics, children of the youngest mothers performed better on assessments of gross motor skills than children of mothers aged 20 to 21, marginally better than children of 18 to 19-year old mothers on assessments of fine and gross motor skills, and significantly better than 18 to 19-year old mothers on the composite measures of motor skills.

Table 6. Estimates of Physical Well-Being and Motor Development in Kindergarten by Age of Mother at Child's Birth, With and Without Controls.^{^z}

Child Assessment	Age of mother at first child's birth				
	17 & under (N=525)	18-19 (N=741)	20-21 (N=815)	22-24 (N=1000)	25-29 (N=1743)
Fine motor skills (0 to 9) ^{C1}					
no controls	5.36	5.33	5.63*	5.78*	6.10***
with controls	5.87	5.65 +	5.81	5.82	5.97
Gross motor skills (0 to 8) ^{C2}					
no controls	6.35	6.14	6.15	6.28	6.27
with controls	6.43	6.20 +	6.19 *	6.28	6.25
Composite motor skills (0 to 17) ^{C3}					
no controls	11.74	11.49	11.78	12.06	12.38**
with controls	12.32	11.86 *	12.00	12.10	12.23
Rating of overall health of child (1 to 5) ^{A4}					
no controls	4.20	4.18	4.28	4.34 *	4.44***
with controls	4.36	4.29	4.34	4.35	4.38

[^] Analyses were conducted for children of mothers of all ages, but only those under age 30 are included for comparison to children of teen mothers.

^z Estimates with controls are based on predicted probabilities from multivariate models that control for all of the characteristics listed in Table 1.

A Parent Report

B Teacher Report

C Direct Assessment

1 7 tasks - building a gate (up to 2 points), drawing a person (up to 2 points), and copying five simple figures (1 point each)

2 4 tasks - balancing, hopping, skipping, and walking backwards (up to 2 points each)

3 Combination of fine and gross motor skills list above

4 1=poor; 2=fair; 3=good; 4=very good; 5=excellent

Significance indicates difference between children born to teen mothers aged 17 and younger and all other age groups.

***p<.001 **p<.01 *p<.05 +p<.10

In summary:

- Before controlling for child and maternal background characteristics, children born to mothers aged 17 and younger began kindergarten with lower scores on cognitive tests and assessments in reading, math, general knowledge, language and communication, and approaches to learning than children born to women in their twenties (Tables 2, 3 and 4). Children's scores in these areas increased in tandem with maternal age. After controlling for maternal, child, family, and household characteristics, the extent of these differences declined. However, children born to mothers in their late twenties still had the highest cognitive test scores and assessments.
- Before controlling for maternal and child characteristics, as maternal age at birth increased, children demonstrated fewer negative and more positive behaviors. Specifically, children of teen mothers aged 17 and younger exhibited fewer social skills and lower levels of emotional well-being, on average, than children of mothers in their twenties (Table 5). When controls were in place, however, differences in maternal and child characteristics explained all of the differences between children of teen mothers and children of mothers in their early twenties. Still, children born to mothers in their late twenties exhibited the highest levels of social skills and emotional well-being.
- Regarding physical well-being and motor development, differences between children born to teen mothers aged 17 and younger and mothers in their twenties were limited. Before controlling for maternal and child characteristics, children born to young teen mothers had fewer fine motor skills and a lower rating of overall health than children born to mothers aged 22 to 24 and 25 to 29. However, after adding background controls, there were no significant differences in health status of children by maternal age at birth. The two exceptions were a *higher* level of gross motor skills found among children of teen mothers aged 17 and younger than

among children of mothers in their early twenties and a *higher* level of composite motor skills among the children of the youngest teens compared with children of teenagers aged 18 to 19.

Discussion

The vast majority of children born to teenage mothers grow up in economically and educationally disadvantaged households. Nearly nine out of ten children born to mothers aged 17 and younger had mothers who were not married at the time of their birth, and most of these mothers had, at most, a high school diploma. Clearly, children of teen mothers start life with more disadvantages than children born to older women. Just how the mother's age at birth affects these children was explored both without controls and with controls and yielded some interesting findings.

Without controlling for background characteristics, compared to children born to women in their twenties, children of teen mothers aged 17 and younger began kindergarten with lower scores in five areas of school readiness: cognition and knowledge; language and communication skills; approaches to learning; emotional well-being and social skills; and physical well-being. On 19 of 26 measures, children born to teens aged 17 and younger fared moderately worse than children born to mothers aged 20 to 21. Moreover, when compared with children born to mothers aged 22 to 24—and particularly those aged 25 or older—the differences were larger.

This scenario changes somewhat when background characteristics are taken into account. Although the mother's age at birth remains important, its effect diminishes. In other words, the analyses show that part of the reason children of teen mothers begin kindergarten behind in several areas is because of their family's social and lower economic status and a higher likelihood of being in a single-parent household. Even so, older age at first birth is still associated with enhanced school

readiness after controlling for maternal and child characteristics. Indeed, children born to the oldest group of mothers (age 25 to 29) fared the best. Differences on assessments of cognition and knowledge and language development remained strong even after controlling for background characteristics, suggesting that children of the youngest teen mothers are starting school with deficits resulting from factors other than family structure and SES.

Children born to mothers aged 18 to 19 did not perform significantly better than children of mothers aged 17 and younger in any area. This suggests that merely delaying births into the later teen years does not result in notably improved early development for these children. In fact, three measures of motor skills (fine, gross, and composite) showed *poorer* outcomes among children of mothers aged 18-19 than those aged 17 and younger even *with* controls. One possible explanation for this difference may be household composition. A child born to a very young teen might be more likely than a child born to an older teen to live with their mother *and grandparent* so the teen mother can attend school. These children may benefit developmentally from having an older adult in the home. Another factor to consider is that mothers aged 18 to 19 are more likely to be married at the time of their child's birth (almost one-third were married compared with 12 percent of mothers aged 17 or younger). Although that fact would seem advantageous for children of older teens, marriages to teens are notoriously unstable, potentially exposing children to conflict and turbulence (Ryan et al., 2004).

Previous research indicates that low educational and economic attainment among teen mothers often results from disadvantages that existed before they gave birth. However, analyses using sophisticated multivariate models have found that having a

teen birth further increases the likelihood that a young woman will drop out of school, live in poverty, and end up relying upon public assistance (Maynard, 1997). By delaying childbearing until her twenties or later, a young woman can develop a more stable and established portfolio — education, employment, marriage — than she would have as an adolescent mother. However, if a mother makes little progress economically or educationally between her mid-teens and early twenties, simply being older is unlikely to help her child make great strides in terms of kindergarten readiness.

Conclusion

These findings suggest that teen pregnancy prevention programs need to delay childbearing not just by a few months or even into the late teens, but into the twenties, to enhance children's development. In addition, programs that include an emphasis on academic and employment success may be valuable. These programs not only can reduce the incidence of too-early childbearing, but they also may help improve school-readiness in the next generation by enhancing the economic, educational, and marital status of women before they become mothers (Philliber, Kaye, & Herrling, 2001; Philliber, Kaye, Herrling, & West, 2002).

It would be valuable to repeat these analyses using later years of ECLS-K data to see whether the gaps related to age at first birth that were significant at kindergarten entry close over time or, instead, mark the start of increasing disparity as these children age. It also would be instructive to assess the factors associated with better child outcomes for children born to teenage mothers. This could help point to intervention strategies that should be stressed in support programs serving young mothers and their children.

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1776 MASSACHUSETTS AVENUE, NW
SUITE 200
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WWW.TEENPREGNANCY.ORG



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4301 CONNECTICUT AVENUE, NW
SUITE 100
WASHINGTON, DC 20008
(202) 572-6000
(202) 362-8420
WWW.CHILDTRENDS.ORG