



Time-Varying Outcomes Associated With Maternal Age at First Birth

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Abstract

Objectives The operational definition of early motherhood remains equivocal across the literature. In response to the tendency of using age at first birth as a categorical predictor in previous research, the time-varying relationship between maternal age at first birth and socioeconomic and parenting/home outcomes was examined using longitudinal data.

Methods Time-varying effect models were employed to examine educational attainment, home/parenting quality scores, and annual income as a function of age at first birth, controlling for race/ethnicity and presence of the father in the household during child ages 6–9.

Results Peak scores for outcomes were observed around maternal age 30 in all three models. Parenting/home quality improved with maternal age at first birth until mothers reached the late 20's, when scores appeared to level out. Highest grade completed increased until just after age 30. Total annual income increased considerably until about age 30 then leveled out, although the plateau may be due to reduced sample size at the most advanced maternal ages. Father presence in the household and race/ethnicity were associated with all three outcomes.

Conclusions Overall, later maternal age at first birth was associated with incrementally increasing parenting/home quality, greater educational attainment, and higher annual income. The results highlight the loss of information when utilizing categorical age groups to predict outcomes and suggest that optimal socioeconomic and parenting outcomes increase with age, leveling out around age 30. Researchers should consider curvilinear patterns of outcomes related to maternal age at first birth rather than rely on categorical comparisons of age groups.

Keywords Maternal · Parenting · Age · Income · Education

Despite a gradually declining teenage birth rate in the United States in recent years, the U.S. maintains one of the highest incidence rates of teen motherhood among developed countries (Sedgh et al. 2015). A wealth of literature spanning social science, economics, and public health demonstrates a clear relationship between teenage motherhood and adverse social, economic, educational, physical, and mental health outcomes for both mother and child

(Hobcraft and Kiernan 2001). Teenaged mothers are much more likely to drop out of school and to rely on social assistance and are at higher risk of some obstetrical outcomes such as very preterm delivery (Black, Fleming and Rome 2012). In addition, there is evidence that young maternal age at first birth is associated with poorer parenting practices, which negatively affect child outcomes (Fergusson and Woodward 1999). In the U.S., costs associated with teenage parenting, specifically, are estimated to be close to 9.4 billion in taxpayer dollars annually, with much of this cost related to foster care, health care, criminal justice, lost tax revenue from unemployed mothers, and programs that offer public assistance (CDC 2010). These costs to young mothers, their families, and the general public have fueled years of research and prevention efforts aimed at delaying entry into parenthood.

Across the extant literature related to the issue of teen motherhood, researchers often use “teenage”, “young”, and “early” parenting interchangeably as predictors of associated outcomes. Various research teams have

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inconsistently defined early motherhood, with some researchers utilizing 18 or 19 as the age cutoff, and others using 21 as the age before which a first birth was considered “early” or “teenage” (Boden et al. 2008; Chevalier and Viitanen 2003; Gibb et al. 2014; Hawkes and Joshi 2012; Jeon et al. 2008; Chen et al. 2007). Other researchers have failed to find a justifiable difference between outcomes for those who had their first birth between the ages of 18 and 19 and those who were under age 18; rather, outcomes predicted by age at first birth tended to stabilize after about age 23 (Hobcraft and Kiernan 2001). A study that compared three age groups (younger than 20, 20–24 year-olds, and 25 and older) of mothers at their first birth, found a positive effect on mental health outcomes for mothers who gave birth at 25 or older compared to teenage mothers, though no notable differences existed for the intermediate age category (Aitken et al. 2016). Addo, Sassler, and Williams (2016) found that delaying childbearing into the early twenties did not significantly improve educational outcomes for mothers compared to those in their late teens, and other research has found no meaningful differences in maternal health and socioeconomic outcomes between teen mothers and mothers aged 20–24 (Williams et al. 2015; Gibb et al. 2014). Clearly, operationalization of early motherhood by categorizing or dichotomizing age has been inconsistently applied. It appears that a more standardized and less dichotomized method of assessing maternal age could shed light on actual outcomes for mothers and clarify inconsistencies in the current literature. Fergusson and Woodward (1999) pointed out that, “for the purpose of analyzing the effects of maternal age, models that examined the full childbearing age range were more precise and informative than dichotomous younger versus older mother comparisons” (p. 480). From the literature reviewed here, it is clear that outcomes tend to improve for mothers and their children as maternal age increases. However, most evidence has relied on dichotomous categorizations of older versus younger mothers which may not best capture the nature of these associations. Thus, it is the aim of the present study to observe the trajectory of socioeconomic and parenting outcomes based on maternal age measured as a continuous variable.

Socioeconomically, early maternal age has been shown to be associated with decreased earnings. Results of one study indicated that early maternal age (<18 years of age) was associated with greater welfare dependence, overall lower income, and less participation in paid employment in early adulthood (ages 21–25), when compared to maternal age of 18–21 (Boden et al. 2008), even when controlling for covariates of social, family, and childhood factors. Additionally, a study of British teenage mothers found that they were less qualified in terms of labor market participation and were paid 8–10% less than women who did not become

mothers during their teen years (Chevalier and Viitanen 2003). In a study of U.S. mothers, delaying motherhood was associated with increases in career earnings of as much as 10% per year of delay, and an increase in total career hours of work by about 5% (Miller 2011). Similarly, Hobcraft and Kiernan (2001) found that teenage mothers were about 40% more likely to receive public assistance benefits and have low household income than those who became mothers in their 20’s and early 30’s. Though no exact age has clearly differentiated outcomes by age at first birth, this evidence points to the relationship between earlier onset of parenting and lower levels of economic attainment. This phenomenon may influence parents’ success in other domains of social, familial, and health variables. These conclusions warrant caution when considering the cause and effect relationship, but they remain important when considering the relationship between maternal age and socioeconomic outcomes.

Similarly, education is strongly linked to individuals’ rate of employment and level of earnings (U.S. Department of Education 2016), thus, some hypothesize that early parenting interrupts the educational trajectory for many young mothers and leads to decreased earning potential (Lee 2010). For instance, a 2008 study found that, as with earnings, young maternal age (<18) was significantly associated with lower rates of educational attainment, including tertiary or university degree completion (Boden et al. 2008), when compared to women of slightly older maternal age (18–21). Chevalier and Viitanen (2003) found that women who became mothers during their teen years were 24% less likely to continue their education beyond high school. This difference was, in part, accounted for by characteristics of women prior to teenage pregnancy, but it was also partially explained by the obstacles young mothers face as a direct result of the demands of parenting and barriers related to continuing education. A more recent study examining the effects of teen childbearing on educational attainment estimated a loss of three-quarters of a year of schooling for those who become mothers before age 20 (Kane et al. 2013). This finding, while consistent with other research results showing negative association between teen motherhood and educational status, highlights the potentially exaggerated magnitude of these effects while also raising questions about the utility of focusing solely on teen mothers compared to those in their early 20s. Similarly, Fletcher and Wolfe (2009) found that teenage childbearing bore no strong effect on years of schooling, although it was associated with a decrease in likelihood of earning a high school diploma. In general, however, the negative correlation between teen parenting and educational attainment appears consistent in the research.

In addition to the socioeconomic outcomes that influence quality of life and health, it is important to consider the

relationship between maternal age and parenting behaviors. Again, the operational definition of early versus late motherhood is inconsistent in the literature; the variable is most often measured as dichotomous, thus eliminating the ability to determine if maternal age has a gradual effect on outcomes. Therefore, it is unclear when healthier parenting behaviors emerge and/or stabilize. The “maternal maturity hypothesis” proposed by Hofferth (1987), claimed a link between parenting practices and maternal age, with Hofferth asserting that older mothers were more likely to exhibit better parenting practices and create healthier home environments than younger mothers. This hypothesis posits that with age, mothers are better able to accrue the necessary psychological resources for entering parenthood, which in turn leads to more optimal parenting. For example, younger mothers have been found to exhibit less supportive, receptive, and verbal behaviors and are more often characterized as detached or intrusive with their children than older mothers (Bornstein et al. 2006). In addition, Fergusson and Woodward (1999) found that younger maternal age at first birth was related to less nurturing and more punitive parenting practices. Seminal work by Brooks-Gunn and Furstenberg (1986) illustrated that differences in child outcomes related to maternal age at first birth appear to grow as children develop and enter into the elementary years; this highlights the long-term correlates of young maternal age across the life course. This, in conjunction with the prevailing focus on parenting during infancy and early childhood (e.g., Bornstein et al. 2006), underscores the need for the longitudinal examination of how maternal age at first birth predicts parenting at other childhood developmental periods, such as middle childhood.

Notably, Bornstein et al. (2006) found that age 30 marked a point at which certain parenting outcomes seemed to level out, potentially due to the stabilization of personality traits that allow for better navigation of complicated environments and stressors. Biological maturation may also influence parenting behaviors, such as in the case of neurobiological development of systems involved in impulse control, emotion regulation, planning and decision-making (see Baylin 2016). It is of note that the age associations with certain parenting outcomes varied depending on the parent domain in question (e.g., intuitive parenting, time commitment to parenting, health of the parent). Although cultural differences in the perception of “optimal” parenting likely exist, the evidence is clear that maternal maturity is associated with more responsive, sensitive, and stimulating parenting behaviors which are viewed almost universally as positive, desirable parenting traits (see Camberis et al. 2014). Using theoretical frameworks may prove useful in conceptualizing how various mechanisms coalesce to determine parenting quality, although cause and effect currently remain unclear.

Unfortunately, a vast majority of extant literature regarding parenting and its relevant covariates has relied upon White/European, middle-class families to identify socially prescribed parenting norms and expectations (Coll and Pachter 2002). However, families with minority race/ethnicity status must function under societal conditions that systematically disadvantage them. For example, racial discrimination poses a chronic stressor to racial/ethnic minority families both overtly and in subtle ways that can increase psychological distress and decrease socioeconomic success (e.g., Heard-Garris et al. 2018; DeNavas-Walt and Proctor 2014). Further, neighborhood disadvantage, perceived discrimination, and the race-wealth gap have been shown to be negatively associated with positive parenting practices in minority families (e.g., Simons et al. 2016). Notably, parenting behaviors may vary in their impact on healthy youth development depending on cultural context and across minority ethnic group status (Brody and Flor 1998). It is therefore important to consider the potential racial/ethnic differences in research that examines parenting and socioeconomic factors.

Furthermore, research regarding paternal cohabitation is considerably mixed in regard to what is known about its effects on parent and child outcomes. For instance, some have argued that cohabitation may lead to additional accumulation of resources and parental involvement, allowing for more time spent taking care of the household or spending time with children, although these benefits appear to depend on various moderating factors (Thomson and McLanahan 2012; Nepomnyaschy and Teitler 2013). On the other hand, cohabitation may indicate family instability (Manning 2015), worse maternal mental health (e.g., depressive symptoms), or fewer socioeconomic resources (Artis 2007), which then can lead to worse child well-being and behavioral outcomes (see also Brown 2004). In terms of whether paternal cohabitation is related to maternal education, the research is also mixed, with some indication that race/ethnicity is an important moderator (Eshbaugh 2008). Overall, it is important to take into consideration how having a child’s father in the household covaries with maternal age at first birth to predict socioeconomic and parenting outcomes for mothers.

It is also important to mention that pre-existing circumstances likely account for a majority of the association between maternal age and deficiencies in parenting. In other words, a woman’s prior experience, family history, trauma, and other developmental factors appear to be more determinative than precocious transition to parenthood itself (e.g., Kearney and Levine 2007). It is essential that future research consider the role of prior history and mental health status in the examination of age and parenting outcomes (see Putnam-Hornstein et al. 2015; Driscoll 2014). The findings outlined here, while not indicative of any causal

relationship, provide impetus for the present study's aim of better understanding how parenting varies by age of first birth, continuously. Because the impact of parenting factors on child development is so substantial, the repercussions related to maternal age and parenting practices may be long-term and seen across generations (see: Lomanowska et al. 2017; Perry et al. 2013; Karreman et al. 2006). The implications for both mother and child make this area of study an important one within psychological, sociological, and public health domains of research and policy. The current study seeks to identify whether the relationship between age of first birth and socioeconomic and parenting outcomes is linear, curvilinear, or otherwise, and determine whether there is a threshold age where outcomes plateau. This knowledge can help inform future research which may improve the design of policies, practices, and programs that promote the delay of childbearing until conditions are right for healthy development of mother and child.

Poor outcomes strongly tied to early motherhood (such as less educational attainment, lower income, and low-quality home environment) highlight the notion that delaying motherhood may be related to improvements in educational attainment, economic stability, and aspects of parenting. In the existing literature there is no empirically identified age at which these outcomes seem to improve. The literature often treats maternal age at first birth during the teenage years as most problematic despite some evidence that problems associated with young parenting may persist into the twenties (Addo et al. 2016). Thus, we hypothesize a gradual increase of positive outcomes (educational, income, & parenting/home) as age of mother at first birth increases. We also hypothesize race/ethnicity will influence predicted outcome coefficients, such that minority race/ethnicity status will be associated with relatively lower income, educational status, and home/parenting quality across the range of child-bearing years. Third, based on some of the extant research on paternal cohabitation, we expect that having the child's father in the home will be associated with mothers' report of greater income, increased number of years of education, and higher scores on home/parenting quality, based on the assumption of benefit from additional emotional and material resources.

Method

Participants

Data from the National Longitudinal Survey of Youth-Child and Young Adult cohort was utilized. Compilation of all needed variables required using both the original NLSY-79 cohort data and the Child and Young Adult data. Thus, the sample for this study included responses from children and

young adults, and their mothers, from various geographic locations across the US who reported on a variety of measures related to family background, work history, education, and parent-child relations, among others. The present study examines mothers of respondents from the NLSY-79 Children and Young Adults 1979 birth cohort ($n = 3335$).

Procedure

The NLSY 79 was commissioned by the U.S. Bureau of Labor Statistics (2012; Children and Youth of the National Longitudinal Survey of Youth 1979 Cohort, <http://www.bls.gov/nls/nlsy79ch.htm>). Data from this study are representative of the U.S. population. A multi-stage stratified area probability sampling procedure was used with moderate oversampling of participants who identified as Hispanic/Latinx, Black, and economically disadvantaged non-Black/non-Hispanic participants. Participants from the Child and Young Adult cohort were surveyed annually from 1979 to 1994, and surveys were conducted with participants every two years since 1994. This secondary data analysis did not require institutional review. The Research Integrity and Compliance Review Office at the first authors' home institution considered this study exempt from review because the variables from the NLSY data set used in the present analyses were prepared with the intent of being available for public use, and therefore the data are not individually identifiable.

Measures

Mothers

Mothers of the NLSY-79 child cohort comprised the sample for the present study. In the NLSY data, mothers self-reported their age at the birth of their first child. Cases were selected containing data only from first-born children and their mothers to ensure that analyses were based on the predictor variable of mother's age at first birth. Data were retained for those respondents who had observations during the years in which children were ages 6–9. The first case in which the child was age 6–9, father presence in the household was assessed, and there was an observation of the HOME-SF scale was retained and used in the present analyses. Maternal age itself was a continuous time variable used to model the outcomes of interest: income, education, and parenting/home environment.

Total annual income

Total reported annual income was included as a continuous outcome variable and was calculated as the total dollar amount received from wages, salary, commissions, or tips

Table 1 Descriptive statistics

Variable	Level	M(SD)	Range	N
Mother's age at first birth		23.42 (5.43)	14–45	3335
Race/ethnicity (%)	Black: 26.33			878
	Hispanic: 18.74			625
	non-Black/non-Hispanic: 54.93			1832
Income		29338 (34456)	0–370314	2419
Years of education completed		13.55 (2.51)	3–20	2513
HOME-SF		19.99 (3.83)	2–27	3335
Father present in household (%)	no: 39.76			1326
	yes: 60.24			2009

from all jobs before deductions for taxes. Income questions in the NLSY79 refer to the previous calendar year, and for this study the most recent interview response was utilized, thus total income for the 2014 interview reflects the respondent's reported earnings for the entire 2013 year. Income from the 2014 interview was used in analyses to examine the most recent indicator available. By choosing a constant, recent year, variability associated with differences in the larger societal and economic conditions were thereby controlled. The raw numerical value of total income exhibited a right-skew, not uncommonly observed when using variables related to earnings. Thus, we performed a logarithmic transformation of income (first adding a constant of one), and the transformed values were used in subsequent analyses. Upon visual inspection, distribution was improved by this transformation. Of note, not all cases from the full sample were observed in analyses examining annual income. See Table 1 for sample sizes.

Education

Educational attainment was determined by examining mothers' reported highest grade completed, with larger values indicating more years of education. Post-secondary education (e.g., college, professional school) was accounted for as each additional year after twelve years of education (i.e., high school graduate). Again, a smaller number of cases, compared to the full sample, was observed in analyses examining educational attainment (see Table 1).

Parenting and home environment

To assess quality of parenting and the home environment, the Home Observation of the Environment-Short Form (HOME-SF) was used. This measure represents a modified version of the original HOME measure from Bradley and Caldwell (1979) and includes items from both mother and interviewer reports. Measurements from when the mother's child was age 6–9 years were used in the present analyses to assess childhood experiences of parenting and home

quality. HOME-SF allows for the examination of the level of emotional support from parent to child (e.g., responsiveness, monitoring), discipline (e.g., mild or harsh reprisals, deprivation, giving chores as punishment), and characteristics of the home environment (e.g., safety, cleanliness, availability of books/toys) that may contribute to the cognitive stimulation of children in the household.

Responses to items on this measure are scored as binary, with 1 indicating the presence of a supportive environment and 0 indicating absence of supportive factors. Scores are summed, with higher overall scores being indicative of more supportive home environments. For the purposes of the present study, the final summed score was divided by 10 because scores in the NLSY public data file contained an implied decimal place. Some example items include endorsement or denial of the following statements based on either the mother's self-report or interviewer observation: "Play environment is safe"; "Mom showed physical affection to the child"; "Child has one or more cuddly, soft, or role-playing toys" (NLSY79-CYA). Campbell and Parcel (2010) found reliability (using Cronbach's alpha) for items from the age 6–9 age category to be between 0.61 and 0.76 using data from NLSY mothers. Other studies have confirmed good reliability and demonstrated good validity as well (for validity see Orth 2017; for reliability see Smith 2011).

Race/ethnicity

Participants self-reported their identified race/ethnic cohort from a list of options supplied by the survey. Racial demographic information was coded into three categories: "Hispanic", "Black", and "Nonblack/non-Hispanic" (which included those whose race was coded "White" or "other" and did not identify themselves as either Black or Hispanic). This variable was used to identify the effects of race/ethnicity on outcomes related to parenting, education, and income, and it was dummy-coded with non-Black/non-Hispanic mothers as the reference group. Racial demographic information for this subset show ~19% of

respondents were Hispanic, 26% were black, and 55% were Non-black/non-Hispanic. See Table 1 for more demographic information and sample sizes.

Father presence in the household

In order to account for the effect of presence of the child's father in the household, we included a time invariant variable that indicated whether the mother and father lived in the same household as their child during child ages 6–9. Of note, marital status was not considered due to evidence that parental marriage and cohabitation appear to differentially predict family outcomes (Manning 2015). Fathers who did not live in the household during this time frame were coded as the reference group (i.e., if the child's father was not living in the household, it was coded as 0). The variance associated with having father present in the household is important to the primary relationship under study, as the extant literature regarding effects of paternal residence remains mixed. Some studies show that paternal cohabitation strengthens families due to additional income and/or socioemotional support from a partner, while others demonstrate negative effects of cohabitation on parent and child outcomes (Manning 2015).

Data Analyses

A time-varying effect model (TVEM) using SAS 9.4 was estimated to observe trends in outcomes depending on maternal age at first birth. This statistical approach allows for the examination of the influence of age as a continuous variable on the selected outcome variables. Allowing for the calculation of regression coefficients as a function of continuous time improves upon other statistical methods by enabling us to observe if and how outcomes vary across developmental age (Lanza et al. 2016). Moreover, TVEM does not use parametric constraints to model the outcome, allowing the data to be estimated in a more nuanced manner than other statistical methods (e.g., linear regression modeling). The TVEM approach is particularly conducive for the purpose of this study, which is to determine the actual shape of the time-varying relationship between maternal age at first birth and a set of outcomes that are meaningful for both mother and child.

We estimated a series of models in which the time metric was maternal age at first birth for all models. Separate models were estimated for each outcome of interest (i.e., income, education, home/parenting) using the penalized truncated power spline method (p-spline). For all models, 10 knots were utilized, as per recommendations from Li et al. (2015). Because the p-spline approach automatically selects an optimal level of smoothness when a large enough number of knots are specified (i.e., 10 or more), fit statistics

are not presented. Initial unconditional models were specified including age at first birth as a predictor of income, highest year of educational attainment, and HOME-SF scores. All outcomes were treated as continuous variables. Following these initial models, additional time-varying curves that included control variables (i.e., race/ethnicity, father presence in household) were estimated, and these results were compared to identify whether the overall curve shifted up or down significantly from the reference group (Non-Black/Non-Hispanic mothers who did not live with the child's father) based on these factors.

Results

The time-varying associations between maternal age at first birth and the three target outcome variables are shown in Figs 1–3. First, we observe that scores on the HOME-SF measure steadily increase from age 13 until leveling out

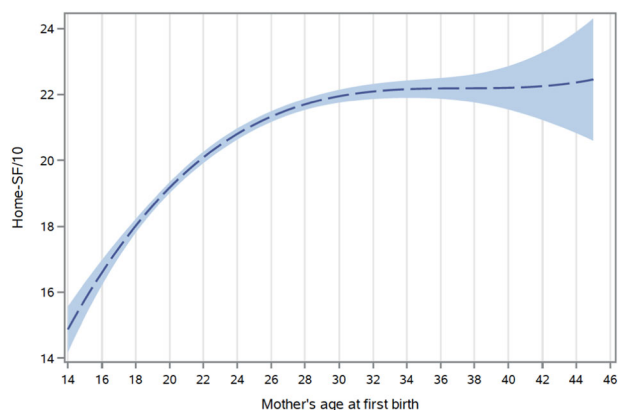


Fig. 1 HOME-SF scores (divided by 10) as a function of maternal age at first birth, with 95% confidence interval indicated by shaded region around curve. $N = 3335$

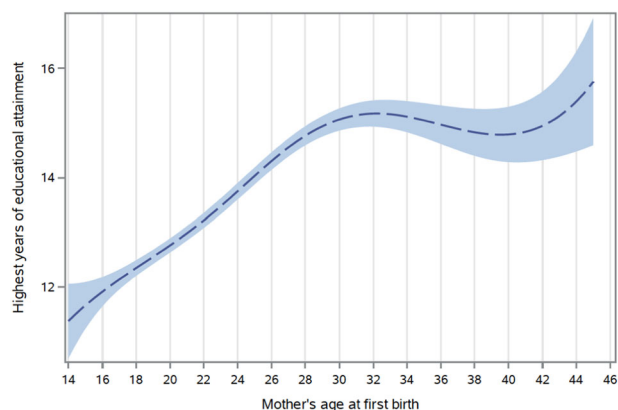


Fig. 2 Educational attainment as a function of maternal age at first birth, with 95% confidence interval indicated by shaded region around curve. $N = 2513$

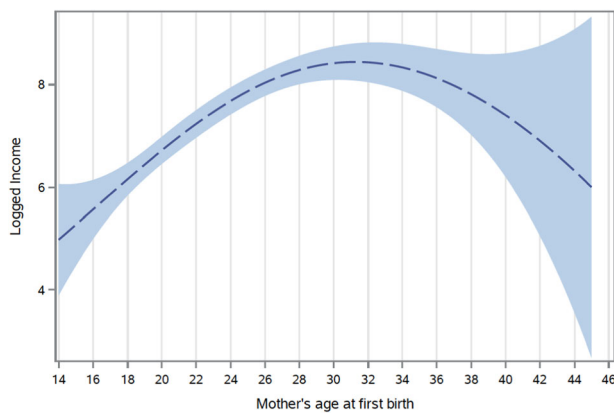


Fig. 3 Total annual income (natural log transformed) as a function of maternal age at first birth, with 95% confidence interval indicated by shaded region around curve. $N = 2419$

around the late 20's (see Fig. 1). These parenting and home environment scores are at their lowest (HOME-SF = ~15) when maternal age at first birth is at its youngest, though scores climb quickly through the late teenage years. Between ages 20–30 there is a clear plateau around a score of 22 on the HOME-SF scale. Similarly, the model examining the relationship with highest grade completed and age at first birth demonstrates the lowest educational attainment initially for the youngest mothers, followed by a clear, steady increase in grade attainment as maternal age increases (see Fig. 2). On average, mothers at the youngest ages appear to complete some high school. At about age 30 we see a peak attainment level of around 15 years of education completed. Figure 3 illustrates changes in total annual income (natural logged) at the most recent interview depending on maternal age at first birth. This curve demonstrates a gradually increasing trajectory. Income increases steadily until around age 30, with the most dramatic increasing slope observed from about age 20–30. Here, we can see that total logged income reported for mothers with age at first birth in their late 20's appears to approach one and a half times the amount seen for those who have their first child at or before age 20. The standard error of the estimates become very large toward the end of the maternal age distribution and should be considered with extra caution.

We next augmented the TVEM models to account for race/ethnicity and cohabitation with father at child ages 6–9. We added these as time-invariant covariates. Because of this, the following results are discussed under the assumption that the effects are constant across maternal age. Adjusting for maternal age at first birth and race/ethnicity, father's presence in the household was a significant predictor in all three models, such that having a child's father in the home during the child's ages 6–9 was associated with higher maternal educational attainment ($b = 0.26$, $SE =$

0.10 , $p = 0.009$), improved HOME-SF scores ($b = 1.96$, $SE = 0.13$, $p < 0.001$), and greater logged annual income ($b = 0.76$, $SE = 0.22$, $p < 0.001$). Adjusting for maternal age at first birth and father's presence in the household, Black mothers, compared to non-Black/non-Hispanic mothers, had marginally greater educational attainment ($b = 0.20$, $SE = 0.10$, $p = 0.06$) and lower HOME-SF scores ($b = -1.54$, $SE = 0.15$, $p < 0.001$), but logged income did not substantially differ ($b = -0.22$, $SE = 0.25$, NS). Adjusting for maternal age at first birth and father's presence in the household, Hispanic mothers, compared to non-Black/non-Hispanic mothers, had fewer years of educational attainment ($b = -0.70$, $SE = 0.14$, $p < 0.001$) and lower HOME-SF scores ($b = -1.20$, $SE = 0.16$, $p < 0.001$), but logged income did not substantially differ ($b = 0.07$, $SE = 0.25$, NS).

Discussion

Across the extant literature regarding maternal age at first birth, there is a clear trend toward utilizing discrete age categorizations to compare “teenage,” “young,” or “early” motherhood to later onset motherhood. These dichotomous comparisons fall short in accurately identifying patterns of outcomes related to maternal age across the full range of childbearing age. The present study improves upon this shortcoming by illustrating continuous patterns of change across age for certain pivotal maternal outcomes. Time-varying effect modeling was employed using a nationally representative sample of U.S. mothers and their young children, with results demonstrating a gradual improvement in all three outcomes (education, income, and parenting/home quality) as maternal age at first birth increases. More specifically, our results indicate that a plateau of more positive outcomes tends to occur in the late 20's in terms of childbearing age, further highlighting the problematic nature of current categorizations, which often compare teenage parents against all non-teenage mothers. Moreover, the restricted number of mothers at the upper tail of the age distribution warrants caution in interpretation, as the uncertainty in the estimate is substantially greater at the upper tail of the age distribution. Future work is needed that examines the nuances of the experience in this later age range.

Clearly, while the present results do not contradict the commonly held belief that young (e.g., teenage) parenthood is linked to less desirable outcomes, these time-varying models indicate a less dramatic distinction between teenage and young adult (e.g., early 20's) mothers than researchers and the public often assume. Specifically, the observation that outcomes vary—though with a steady upward trend—for mothers who have their first child in their early 20's

suggests that these years represent a time of considerable change in stability for mothers both economically, educationally, and in terms of maternal parenting resources—whether material or psychological. Recent work has demonstrated findings of improved adaptation to pregnancy and parenthood with increased maternal age are accounted for by psychological maturity (defined by adaptive self-regulation and social-cognitive development; Camberis et al. 2014), and the results found in the present study are congruent with the overarching notion that with age comes certain benefits to parenting. That is, psychological maturity likely leads to more responsive and sensitive parenting via greater cognitive flexibility, enhanced self-efficacy, and more mature interpretations of child behavior (Meins 2013).

The significant effect of having the father in the child's household on mothers' total annual income is noteworthy. In conjunction with recent findings that marital status did not protect against negative outcomes related to young maternal age (Addo et al. 2016), our results present an interesting juxtaposition. However, our findings are in line with those of Berger and McLanahan (2015) who found higher levels of family income for biological-father and married-parent families. The finding that having the child's father in the home predicted significantly higher scores on the measure of home environment and parenting in this study suggests that cohabitation with the father may provide certain benefits to mothers that allow them to increase the emotional support and cognitive stimulation conferred to their children. Additionally, it may be that the mere presence of the father in the home serves as a potentially protective factor for young mothers, or it may be that many of the cohabitating couples were also married or that they were more likely to receive other familial support (e.g., physical or financial support from parents/grandparents). The present study's results also echo past findings that showed paternal support has a positive effect on mothers' parenting competence (Roye and Balk 1996), although it is important to consider the nuances of how paternal support is defined across the literature (e.g., co-residence vs. co-parenting, financial vs. emotional support).

The results of this study suggest that researchers should continue to examine which interventions and types of support best meet the developmental needs of young mothers, considering the rapid biological, psychological, and social changes taking place during adolescence and emerging adulthood. In addition, regarding socioeconomic aspects of motherhood, younger mothers may require accommodative supports in order to achieve academic and occupational advancement. As such, researchers and health care providers might benefit from exploring the effects of allowing greater flexibility to those who become mothers earlier in life, especially in regard to schoolwork deadlines and attendance. Further, the results of this study could be

taken together with research on evidence-based practices related to improving access to work and school in order to assess the best ways for young mothers to attain greater educational and financial milestones. For example, access to free or affordable childcare and transportation may be more applicable youngest mothers in order to offset their apparent disadvantage in these areas (Price-Robertson 2010). Based on the results of the present study, additional research appears needed to ascertain how minority race/ethnicity status interacts with cohabitation and age at first birth.

This study also highlights the need for additional studies that further clarify what factors may be protective against some of the undesirable effects associated with young motherhood. In addition to examining the nuances of paternal involvement and how it impacts maternal and child well-being (both socioemotional and socioeconomic) investigations of other forms of social support and personality factors will improve our understanding of how best to reduce negative outcomes associated with young parenthood. In particular, future research should investigate whether there are protective effects unique to paternal cohabitation compared to effects of marriage, or if the effects observed in this study would also be noted when mothers live with any additional household member (e.g., a grandparent) who may similarly provide material and psychosocial resources. Conversely, it is equally important that future studies pinpoint specific characteristics or environmental factors that may exacerbate the occurrence of negative outcomes for mothers, children, and their families depending on maternal age at first birth. Additional births, neighborhood safety, substance use, interpersonal violence, and other related factors merit attention in future investigations.

Future work should also continue to investigate how mothers' age at first birth impacts, directly and indirectly, child outcome variables. For example, the child age range in this study (ages 6–9) is a key developmental period in which academic and behavioral functioning begin to have a greater impact on the child's future social and occupational outcomes. Researchers should consider the ways in which maternal age at first birth may lead to differences in externalizing and internalizing problem behaviors in offspring, particularly for school-age children. Additionally, it would be useful for future studies to examine paternal cohabitation as a time-varying factor in order to understand at what maternal ages promotive effects are most apparent. In the present study, we find evidence of a beneficial effect of having the child's father in the home when considering this as time-invariant; future work should consider how this variable may vary in its effects depending on both paternal and maternal ages, as well as across child developmental stage. We also highlight the need for continued work that examines how married versus non-married cohabitating

couples differ in terms of the costs and benefits each brings to a household, and how these may be moderated by key socioeconomic and demographic variables.

With current trends clearly signaling that more women are delaying childbearing (Mathews and Hamilton 2016), the present study provides additional context from recent decades that may be useful in comparing how outcomes differ in future samples, considering the changing landscape of educational, economic, and cultural domains. Further, as sociopolitical changes take place, mothers will be continually confronted with the need to adapt to shifts in welfare and economic laws, fluctuations in the job market, a rising standard of educational attainment (e.g., more women in higher education; Becker et al. 2010), and other variations in cultural and societal expectations and norms. Future studies should seek to identify how trends may be changing for mothers depending on the age at which they enter into parenthood.

Limitations

The present study should be considered in light of some of its limitations. First, we use oversimplified categorizations of race/ethnicity to identify broad differences among mothers even though racial identity is a complex socially-constructed concept. Future work should delve more deeply into how more specific cultural differences may better illustrate variability in maternal health, socioeconomic indicators, and child well-being depending on age of first birth. Similarly, using income has limited capacity to illustrate the complexities of socioeconomic status and does not allow for assessment of how maternal age may change a mothers' economic trajectory. This also applies to the way in which education was measured; readers should carefully consider that at the upper end of the measure of educational attainment, meaningful differences become important to consider. For example, post-secondary education is highly varied in terms of the number of years required to achieve a graduate degree (e.g., law school versus other doctoral programs). While measuring education as a continuous outcome is reasonable in the context of this study, it also constitutes a limitation as it does not allow for a nuanced view of the highest levels of attainment. Inclusion of additional variables that highlight specific indicators of financial strain (e.g., struggling to afford basic necessities) and other alternative markers of economic health (such as income-to-needs ratio) and education would provide further clarity with regard to socioeconomic outcomes related to maternal age at first birth.

Additionally, although mother-child interaction is arguably of utmost importance during a child's first few years of life (Maggi et al. 2010), we were unable to utilize HOME-SF scores for younger child age due to the limited number

of mothers that were interviewed when their children were so young. While the present findings for home and parent-child interaction characteristics for children age 6–9 are noteworthy and demonstrate longitudinal associations with maternal age at first birth, additional research is warranted. Because infancy represents a highly significant developmental period in terms of later socioeconomic, cognitive, emotional, and physical and mental health outcomes, future research that employs more flexible statistical methods, such as those used here, should examine maternal age at first birth's effects on parenting in early infancy. Furthermore, along with its strengths (e.g., the wide variety of items assessing cognitive, socioemotional, and physical assessments), the HOME-SF measure is susceptible to measurement error related to the "snap-shot interview approach" which reduces the ability to assess whether behaviors are erratic or consistent, and some observations could vary depending on child/mother mood on the day of interview (Mott 2004, p. 261). Items on this measure may also be culturally prescribed and time era-specific, thus future use of this assessment tool should include enhanced versions that clarify and update obsolete language.

We also point out that while using child ages 6–9 indeed provides insight regarding our research questions, the conclusions drawn from the TVEM outputs should be interpreted with the caveat that measuring our outcomes at other developmental periods may produce different patterns. For example, mothers may have accrued additional resources and skills by the time their child reaches school-age which increases the average level of each outcome measured during this interval. Fathers may also have overcome some of the challenges that are often present upon entry into parenthood, thus the effect of having the father in the home at this developmental period may be different from effects at other stages or around different life transitions. Additional work is needed to further clarify how the curve of outcomes differ across child ages (e.g., immediate post-natal period compared to adolescence).

Finally, while the present study contributes to a more nuanced understanding of maternal age and its associated outcomes, the nature of the study's design makes it impossible to ascertain any causal relationships. Selection effects, or pre-existing maternal factors that lead some mothers into earlier parenthood, are still being explored in the literature and may provide the necessary insights into what accounts for the trends in outcomes observed here. Future investigations should continue examining the impact of maternal age at first birth on child outcomes as they relate to socioeconomic and parenting covariates. Such studies may expand upon our understanding of these patterns by further clarifying mental health status trends and outcomes for mothers across the childbearing age range, and in particular mothers who enter parenthood prior to early adulthood.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval and Informed Consent The Research Integrity and Compliance Review Office at the authors' home institution considered this study exempt from IRB review because the variables from the NLSY data set used in this study were prepared with the intent of being available for public use, and therefore the data are not individually identifiable. Further, the National Longitudinal Survey (NLS) program ensures respondent confidentiality and obtains informed consent via established set procedures. These procedures are in compliance with Federal law and the policies and guidelines of the U.S. Office of Management and Budget and the U.S. Bureau of Labor Statistics. Identifying details of the participants are not published or suggested in the present study.

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