THESIS

TIME-VARYING OUTCOMES ASSOCIATED WITH MATERNAL AGE AT FIRST BIRTH

Submitted by

Celia J. Fulco

Department of Psychology

In partial fulfillment of the requirements

For the Degree of Master of Science

Colorado State University

Fort Collins, Colorado

Spring 2018

Master's Committee:

Advisor: Kathryn Rickard

Kimberly Henry
Paula Yuma

ABSTRACT

TIME-VARYING OUTCOMES ASSOCIATED WITH MATERNAL AGE

Those who become mothers early in life face poorer outcomes related to social, economic, educational, and health factors for both mother and child. The literature often uses teenage and "early" parenting interchangeably as predictors of associated outcomes. However, changing the operational definition of early motherhood to include those who are 19 and under, 22 and under, or 25 and under does not significantly alter results that show younger mothers having worse economic outcomes, comparatively (Gibb, Fergusson, Horwood, & Boden, 2014). In response to the tendency of using age at first birth as a categorical predictor of outcomes, the time-varying relationship between maternal age at first birth and socioeconomic and parenting outcomes was examined using longitudinal data.

A time-varying effect model was employed to display average level of education, home/parenting quality scores, and the odds of poverty as a function of maternal age at first birth, controlling for race/ethnicity and having the father in the child's household. We used data from a national longitudinal study of mothers who participated in the Child and Young Adult cohort of the National Longitudinal Survey of Youth.

Peak scores for all outcomes were observed around maternal age of 30 for all three initial models. Parenting and home quality gradually improved until late 20's when scores appeared to level out throughout the 30's. Highest grade completed increased until just after age 30 then dipped again around age 40. The odds of poverty decreased until about age 30 then leveled out.

Controlling for father's presence in the household and race/ethnicity shifted all three selected effects.

Overall, earlier maternal age at first birth was associated with incrementally decreasing parenting and home quality, lower educational attainment, and greater likelihood of poverty status. The results highlight the problematic nature of utilizing categorical (e.g., teenage vs. non-teenage) age groups to predict maternal and child outcomes. In fact, results of this study suggest that optimal socioeconomic and parenting outcomes level out around age 30 for this nationally representative sample. Current trends in psychological, developmental, and economic research should consider curvilinear patterns of outcomes related to maternal age at first birth rather than relying on categorical comparisons of age groups.

ACKNOWLEDGEMENTS

I would like to extend my gratitude to the mentors and supporters who have inspired and challenged me along my graduate journey so far. Thank you to my committee members who showed me patience, expanded my knowledge, and celebrated this stepping stone with me. To Dr. Kathy Rickard, who opened the door to this chapter and encouraged me to pursue this and many endeavors, to Dr. Kim Henry, who graciously shared her time, expertise, and kind praise throughout this process, and Dr. Paula Yuma who offered thorough and insightful guidance in the crafting of this document; I give you all my biggest thanks. Thank you to my family, and especially my partner in life, Jared, for being my team.

DEDICATION

I would like to dedicate this thesis to the women who inspired me to embark on this graduate adventure.

TABLE OF CONTENTS

Introduction

Despite a gradually declining teen birth rate in the United States in recent years, the U.S. maintains one of the highest incidences 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 & Kiernan, 2001). Teen 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 & Rome, 2012). In addition, there is evidence that younger maternal age is associated with poorer parenting practices, which then negatively affect child outcomes (Fergusson & Woodward, 1999).

These negative outcomes have widespread social and political consequences. In the U.S., costs associated with teenage parenting are estimated to be close to 9.4 billion dollars in taxpayer dollars annually, with much of this related to foster care, health care, criminal justice, lost tax revenue from unemployed mothers, and programs that offer public assistance (CDC, 2010). A study of teen mothers in Australia similarly found that women who had their first child before age 20 were less likely to finish twelfth grade or participate in the workforce, and they experienced worse physical and mental health conditions (Jeon, Kalb & Vu, 2008). This study also revealed that 45% of income support recipients were women who had experienced teenage motherhood, with the youngest mothers accounting for the greatest rates of welfare participation. These costs to young mothers, their families, and the general public have fueled years of research and prevention efforts surrounding teen parenting.

The directionality of the relationship between maternal age at first birth and outcomes is complex and multifaceted. The possibility of confounders—extraneous variables that can hide or exaggerate the relation between two target variables-- should not be overlooked in the attempt to examine the potential effects of a variable of interest (e.g., maternal age). For example, many preexisting socioeconomic variables such as parental education or family income may have contributed to the observed association between young maternal age and poor social outcomes later in life. Similarly, housing security, family functioning, ethnicity, partnership, and mental health conditions have been considered in much of the prior literature related to maternal age and outcomes. (See comparative table 1). Previous literature has found both evidence for and against a cause-effect relationship between early maternal age and outcomes, underscoring the importance of avoiding claims about directionality when considering findings. Nevertheless, there are reliable correlates of early motherhood that emerge in numerous studies.

Both economic hardship and adverse childhood experiences (e.g., abuse or neglect) contribute to early maternal age. Research conducted in the United Kingdom found that becoming a mother during the teenage years is more common for women who come from disadvantaged backgrounds (Hawkes & Joshi, 2012). In a separate study, teenage girls who had been neglected or sexually abused were more than twice as likely to experience childbirth before the age of 19 (Noll & Shenk, 2013). Kearney and Levine (2012) also contended that economic circumstance was often the largest contributor to teenage childbearing. They stated that adverse outcomes associated with being a teen mother should be viewed as one aspect of a pre-established trajectory related to poverty, rather than attributed only to the interceding birth. A woman's history of maltreatment, her socio-economic status, and level of opportunity available to her may contribute significantly to negative outcomes associated with early pregnancy.

Hawkes and Joshi (2012) postulate that delaying pregnancy allows mothers to "accumulate relevant economic, psychological or social resources from which the child benefits" (p. 53), presenting the perspective that older maternal age is protective of poor socioeconomic outcomes. Other research findings support the notion that negative outcomes, such as poor mental health, are often caused by personal circumstances prior to early parenthood (Boden, Fergusson & Horwood, 2008).

Various studies have found a link between exposure to child abuse, family dysfunction, and risk for early parenthood (see: Garwood, et al., 2015; Noll & Shenk, 2013), though other variables appear to moderate this relationship in some circumstances. For instance, Fergusson and Woodward (1999) found that child-rearing practices and other markers of family functioning mediate the relationship between young maternal age and adverse outcomes. They found that as age of first birth increased, home environments became more nurturing, supportive, and stable. In other research, the absence of adolescent girls' fathers in the household was related to the likelihood of their engaging in early sexual activity and subsequent adolescent pregnancy (Ellis et al., 2003). Further, sociodemographic variables and developmental history of young fathers influenced the amount of time they spent at home with their children (Jaffee et al., 2001).

Research investigating early maternal age at first birth as a direct cause of adverse outcomes for both mothers and children has been mixed (Lawlor & Shaw, 2002). Some might argue that social attitudes toward young mothers play a role in shaping the quality of opportunities made available to such women. Culture should certainly be considered in how attitudes toward teenage pregnancy vary; as Smith (2002) points out, among Nepalese girls, giving birth between the ages of 15 and 19 is seen as highly desirable. Sadly, infant and maternal mortality rates are significantly higher in Nepal compared to countries such as Britain and the

U.S. Such findings are in line with previous research that found young maternal age was associated with increased risk for low birth weight and other negative medical conditions for younger mothers and their children (Ganchimeg, et al, 2014).

In addition, Kearney and Levine (2012) argued that geographic location and its associated cultural factors, namely socioeconomic status, contribute largely to a woman's choice to have a child at a young age and out of wedlock. It may be that income inequality of a woman's area of residence influences her decision to have children earlier in life and thus helps explain the higher rates of teen motherhood in areas of relatively higher income inequality. It is clear from this evidence that teen motherhood is linked to outcomes that are considered disadvantageous by most U.S. standards. Longitudinal studies examining the full-range of economic and parenting outcomes related to maternal age are merited.

Outcomes Related to Maternal Age

Economic. 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 to 21 (Boden, Fergusson & Horwood, 2008). Results were significant 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 & 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, a 1999 study by Hobcraft and Kiernan 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 there was no exact age that clearly differentiated between 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. Again, these conclusions warrant caution when proposing directionality, but they remain important when considering the effects of maternal age on life outcomes.

Education. Education is strongly linked to individuals' rate of employment and level of earnings (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, as with earnings, young maternal age (<18) was significantly associated with lower rates of educational attainment, including tertiary or university degree completion (Boden, Fergusson & Horwood, 2008), when compared to women of slightly older maternal age (18-21) . The age categories compared women who had become a mother during these ages to those who reported no early parenting. 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, Morgan, Harris & Guilkey, 2013). This finding, while consistent with other research results showing negative effects of teen motherhood on educational status, highlights the potentially exaggerated magnitude of these effects while also raising questions about the utility of focusing solely on teen mothers compared those in their early 20s. Similarly, Fletcher and Wolfe (2008) 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. Future research could begin to challenge the tradition of focusing on teen mothers as the target of prevention efforts and begin to parse out what meaningful differences in outcomes exist, and when these differences become most apparent between ages.

Parenting. As is evident from the discussion above, economic and educational outcomes remain clearly linked to maternal age at first birth—a link that carries significant implications for both mother and child. 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 style. An important impetus for the present study is to better understand the fundamental effects that age at first birth has on both maternal outcomes, and on the welfare of children. Again, the operational definition of early versus late motherhood is inconsistent in the literature (See Lee, 2009 in comparative table); the variable is most often measured as dichotomous, thus eliminating the ability to determine if maternal age has a gradated effect on outcomes; and, therefore, it is unclear when healthier parenting behaviors begin to emerge. Thus, the present study seeks to improve upon previous literature by using maternal age as a continuous variable that may predict differences in parenting.

The "maternal maturity hypothesis" proposed by Hofferth (1987), claimed a link between parenting practices and maternal age. Hofferth was able to demonstrate 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 were found to exhibit less supportive, receptive, and verbal behaviors and were more often characterized as detached or intrusive with their children than were older mothers (Bornstein et al., 2006; Brooks-Gunn & Furstenberg, 1986). In addition, Fergusson and Woodward (1999) found that younger maternal age at first birth was related to less nurturing and more punitive parenting practices.

Specifically, 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 allowed for better navigation of complicated environments and stressors. 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). While using theoretical frameworks may prove useful in conceptualizing how various mechanisms coalesce to determine parenting quality, cause and effect currently remain unclear.

It is also important to consider specific pre-existing circumstances which may better account for the association between maternal age and deficiencies in parenting. For example, maternal history of abuse has been shown to relate to both earlier age of childbearing as well as next-generation maltreatment of children (Putnam-Hornstein et al., 2015). In other words, there may be an interaction between age at first birth and history of maltreatment that leads to greater likelihood of abuse for children of young mothers. Further, teen mothers disproportionately live

in poverty, with Driscoll (2014) finding that the odds of being a member of the working poor increase for teen and young adult mothers compared to older mothers. It is essential that future research consider prior history and mental health status in the examination of age and parenting outcomes.

Such findings, while not indicative of any causal relationship, provide impetus for the present study's aim of better understanding how effective parenting varies by age of first birth. Because the impact of parenting style 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, Boivin, Hertzman & Fleming, 2017; Perry et al., 2012; Karreman, Tuijl, van Aken & Dekovic, 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.

Limitation of Previous Studies

Results from one study demonstrated that young motherhood was highly related to greater welfare dependence, lower educational achievement, and lower income (Boden, Fergusson & Horwood, 2008). As mentioned, various potential confounders may work together to manifest certain outcomes for younger mothers. A myriad of factors (e.g., ethnicity, history of trauma, parental education and income) interact to increase or protect against the effects of early parenting. However, these outcomes highlight the notion that delaying motherhood may lead to improvements in educational attainment, economic stability, and parenting behaviors. 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, Sassler & Williams, 2016).

The extant literature often uses “teenage”, “young”, and “early” parenting interchangeably as predictors of associated outcomes. The study by Boden, Fergusson and Horwood (2008) used age intervals of prior to age 18, between 18 and 21, and older than 21 in defining early parenthood. In contrast, Chevalier and Viitanen used only age 18 as the age before which pregnancy was considered “teenage motherhood”. A study by Hobcraft and Kiernan (2001) cited exploratory work that found no justifiable difference between outcomes for those who had their first birth at age 18-19 and those who were under age 18. Thus, in their work examining outcomes related to age at first birth, they compared teenagers to those aged 20-22 and 23-25, and found that outcomes tended to stabilize after about age 23 (Hobcraft & Kiernan, 2001). Gibb, Fergusson, Horwood and Boden (2014) categorized those who had had their first birth by age 20 as falling into the early motherhood classification as opposed to older mothers who had a maternal age of 20 or above.

While some studies compared multiple age groups up until about age 25 (Chen, et al., 2007), other researchers still utilized either 18 or 19 as the cutoff for classifying parenthood as “early” or falling in the teenage years (e.g., Hawkes & Joshi, 2012; Jeon, Kalb & Vu, 2008). Aitken et al (2016) compared three age groups (teenagers, 20-24 year olds, and 25 and older) of mothers at their first birth, finding 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. A noteworthy longitudinal study analyzing economic outcomes for mothers who gave birth before age 20 found that changing the operational definition of early motherhood to include those who were 19, 22, and 25 did not significantly alter the finding that

younger mothers had worse economic outcomes, compared to their older counterparts (Gibb, Fergusson, Horwood, & Boden, 2014).

Results of a study from Addo, Sassler, and Williams (2016) were similar, illustrating that delaying childbearing into the early twenties did not significantly improve educational outcomes for mothers compared to those in their late teens. Kane, Morgan, Harris, and Guilkey (2015) pointed out that a changing sociopolitical landscape (e.g., increased rates of attending college, greater need for dual income within families) may mean that even those who delay childbearing into their 20's do not fare significantly better than how teen mothers have in the past. Other research has found no meaningful differences in maternal health outcomes between adolescent mothers and mothers aged 20 to 24 (Williams, Sassler, Addo & French, 2015). Moreover, there are likely various systematic sources of oppression that mothers experience regardless of age at first birth, namely, built-in hiring and promotion decisions that disadvantage mothers, undervaluation of women's work, and the absence of adequate child care (Grimshaw & Rubery, 2015). Such findings highlight the idea that conceptualization of maternal age currently used in the literature may not substantially change the interpretation that younger mothers face greater negative outcomes, and it provides a clear example of the ambiguity in our current understanding of how to define early motherhood.

Chevalier and Viitanen (2003) made the important point that while many young women experience teenage pregnancy, not all of them experience the birth of a child during their teenage years. For example, abortion rates vary as a function of age, with women under the age of 20 accounting for 12 percent of all abortions in the U.S. in 2014 (Jerman, Jones & Onda, 2016). Maternal age has also been found to be predictive of risk of miscarriage; mothers over the age of

35 are almost twice as likely to experience miscarriage than mothers at younger ages (Goldman et al., 2005).

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). Thus, it is the aim of the present study to observe the trajectory of outcomes based on maternal age measured as a continuous variable. 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. The current study seeks to address this gap by identifying whether the relationship between age of first birth and socioeconomic (via educational and poverty status) and parenting outcomes is linear, curvilinear or otherwise, and determine whether there is a threshold age where negative outcomes plateau. This study compares outcomes based on age of first birth across reported ethnicities as well as examines the effect of having a dual parent household.

Hypotheses

1. There will be a gradual increase followed by a plateau of positive outcomes (educational, poverty, & parenting/home) as age of mother increases.
2. Race/ethnicity and presence of child's father in the household will influence predicted outcome coefficients.

Methods

Sample

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=3,335). Only the mothers of participants who indicated that they lived with their mother continuously until age 18 are included in analyses. This approach ensures participants' mothers experienced maternity through pregnancy and childbirth and also went on to parent their offspring.

The NLSY 79 was commissioned by the U.S. Bureau of Labor Statistics (2010; 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 US 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 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 study did not require institutional review. The Research Integrity and

Compliance Review Office at Colorado State University considered this study exempt from review because the NLSY data set was prepared with the intent of being available for public use, and therefore the data are not individually identifiable or private.

Measures

Motherhood. Mothers of the NLSY-79 child cohort are the sample for the present study. In the NLSY data, mothers self-reported their age at the birth of their first child. In the present analyses, maternal age was a continuous time variable for the outcomes related to poverty status, education, and parenting/home environment.

Poverty Status. Total reported family income and the number of family members in the mother's household were combined and compared to national Poverty Income Guidelines to determine Family Poverty Status. The U.S. Department of Health and Human Services updates the national Poverty Income Guidelines annually. The guidelines provide a base income amount for a family size of one with standard increases for each additional family member that lives in the household. This outcome variable indicates the actual status of the mother's family compared with her designated poverty level, with a score of 1 indicating poverty status and 0 indicating being above poverty level. Annual poverty level guidelines based on Census Bureau poverty guidelines were utilized for most years, with the exception of years 1980-1986 during which projected poverty income levels were used, as calculated by Center for Human Resource Research (CHRR) staff.

Education. Education level was determined by examining mothers' reported highest grade completed.

Parenting practices. 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 young 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. 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 for items from the age 6-9 age category to be between .61 and .76 using NLSY mothers. Other studies have confirmed good reliability and demonstrated good validity as well (for validity see Orth, 2017; Mott, 2004; for reliability see Smith, 2011; Baharudin & Luster, 1998; Caughy, O'Brien, DiPetro & Strobino, 1994).

Covariates

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". This variable was used to identify the effects of race/ethnicity on outcomes related to parenting, education, and poverty status.

Cohabitation with father. In order to account for the effect of cohabitation with the father of the child on outcomes, we included a time invariant variable that indicated whether the mother and father lived in the same household as their child. The variance associated with cohabitation with fathers is important to the primary relationship under study, as cohabitation is a protective factor due to additional income and/or socioemotional support from a partner and distant father-child interactions predict greater early behavioral problems in children (Ramchandani, et al., 2013).

Analyses

Because the NLSY-79 represents intergenerational longitudinal data, a time-varying effect modeling (TVEM) technique using SAS 9.4 was employed to observe trends in outcomes depending on maternal age at first birth. This statistical approach allowed 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 with time (Lanza, Vasilenko & Russell, 2016). Moreover, TVEM does not use parametric constraints to determine the output, essentially allowing the data to "speak" 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 meaningful outcomes for both mother and child.

Data Management

Initial steps were taken in data preparation to isolate key variables and to combine data files from both the NLSY79 Child/Young Adult cohort and the original NLSY79 cohort. After the variables were downloaded, two data files were merged: one containing all variables from the Child/Young Adult cohort and the other containing the poverty status variable from the mother's original interviews in the NLSY79 cohort.

Inclusion Criteria

Next, we selected cases 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. Then,

only data from the years during which those children were ages 6-9 were retained, which were the years that contained sufficient data reflecting HOME-SF scores. Maternal poverty status from 2014 was used in analyses to examine the most recent indicator available. In order to control for race/ethnicity, this variable was dummy-coded with non-Black/non-Hispanic/Latinx mothers as the reference group.

Data Analysis

A series of models were estimated using a p-spline based method of model estimation including the four variables identified above (maternal age, poverty status, education, and parenting). In estimating all models, 10 knots were utilized, as per recommendations from Li and colleagues (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 models were run including age as a predictor of poverty status, highest level of education, and HOME-SF scores without including covariates in the models. For analyses including education level and parenting, a linear model was used, treating these outcomes as continuous variables. A logistic model was used for analyses including whether the mother's family qualified as being in poverty or not. Following these initial models, additional time-varying curves that included control variables (i.e., race/ethnicity, cohabitation with father) were estimated, and these results were compared to identify whether the overall curve shifted up or down significantly from the reference group (non-Hispanic non-black mothers not living with the child's father) based on these factors.

Results

Demographics

Racial demographic information for this subset show approximately 19% of respondents were Hispanic, 26% were black, and 55% were Non-black/non-Hispanic.

Initial Outputs

The time-varying associations between maternal age at first birth and the three target outcome variables when controlling for race/ethnicity and cohabitation with child's father are shown in Figures 1, 2, and 3. Because the initial time-varying effect model (TVEM) curves for highest grade completed and HOME-SF outcomes were visually identical to the curves that included the selected covariates, only poverty status is presented in two separate figures, with Figure 4 illustrating the curve of the odds of poverty for the entire sample of mothers without controls included in the model. Thus, the following results discussed below are in reference to the TVEM outputs that represent the coefficient curve of outcomes, keeping race/ethnicity and paternal cohabitation constant (i.e., when Hispanic and black race/ethnicity are equal to 0 and father living in the household equals 0).

Home and Parenting Quality

First, we observed that scores on the HOME-SF measure steadily increase from age 13 until leveling out around the late 20's. These parenting and home environment scores are at their lowest (HOME-SF = about 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 less dramatic, yet still increasing, trend of scores that reach the low 20's on the HOME-SF scale. Upon the onset of the late 20's for age at first birth, scores on the HOME-SF do not appear to vary greatly,

evidenced by a flattening out around a score of 22. The standard error increased substantially around age 38, due to the highly limited number of women having their first child at these ages.

Education

Similarly, the model examining the relationship with highest grade completed and age at first birth demonstrates the lowest educational attainment initially, with some variability, for the youngest mothers, followed by a clear, steady increase in grade attainment as maternal age increases. Most mothers, even at the youngest ages, appear to complete grade 12. At about age 30 we see a peak attainment level of around 15 grades completed. A slight increase in attainment appears to occur for the oldest mothers who had their first child in their 40's, though this increase is uninterpretable due to the extremely low number of mothers in the sample having their first child during this decade of life. See Table 4 for frequency data concerning the number of first births at each maternal age.

Poverty Status.

Figure 3 illustrates changes in the odds of reporting poverty status depending on maternal age at first birth. This curve evinces a relatively flat trajectory when controlling for race/ethnicity and paternal cohabitation. A slight decrease in odds of poverty status is observable as age at first birth increases, with lowest odds reached around age 30. Again, the limited number of mothers who had their first birth in their late 30's into their 40s appears responsible for a rather extreme standard error at this tail end of the curve. This curve is in contrast to Figure 4 which illustrates the TVEM curve representing odds of poverty status for the whole sample, as predicted by maternal age at first birth. In this figure, the odds are greatest, though risk of poverty is still very low, at the youngest maternal ages, and odds of reporting poverty status reach the lowest level around age 30. At the youngest maternal ages (early teenage years), the odds of being in poverty

are more than one and a half times greater than the odds for mothers that have their first child in the late teen years. Risk of poverty decreases dramatically from early teenage years to the mid 20's where we observe a plateau of reported poverty status occurring around the mid-to-late 20's.

Covariate Analyses

As mentioned, the above results refer to the time-varying curve for non-Black/non-Hispanic mothers who do not live with the child's father. We now present the fixed effects coefficients for when the mother also lives with the child's father, as well as for how levels of outcomes differ as a function of the mother's race/ethnicity. Tables 1, 2, and 3 present the estimated fixed effects, and their significance, of these selected factors on educational attainment, poverty, and home/parenting scores across maternal age. Because race/ethnicity and cohabitation with the father were specified as time-invariant control variables, the following results are discussed under the assumption that the effects are constant across maternal age.

Father's presence in the household was a significant factor 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, improved HOME-SF scores, and decreased odds of poverty for mothers. In other words, the general curvilinear shape of the relationship between maternal age at first birth and our selected outcomes remains, but when the child's father is in the household, at each age of mothers at their first birth higher maternal educational attainment, lower likelihood of poverty status, and improved parenting and home quality scores were observed.

For black mothers, the time-varying effects of age of first birth on poverty status differed significantly from non-Black/non-Hispanic single mothers such that black mothers to have an increased likelihood of poverty for each maternal age at first birth. Similarly, a significantly

greater risk of poverty across maternal age was observed for Hispanic mothers compared to non-Black-non-Hispanic mothers. For educational attainment, we saw a positive but nonsignificant (p=.06) positive difference of the fixed effect estimate for Black mothers, while educational attainment for Hispanic mothers was predicted to be significantly lower at each level of the predictor compared to white mothers. Finally, we see significantly lower fixed effects for both black and Hispanic mothers on the home environment and parenting measure, as compared to non-Black/non-Hispanic single mothers.

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. As noted by Fergusson and Woodward (1999), 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, poverty, and parenting quality) as maternal age at first birth increases. Further, 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.

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 (Camberis,

McMahon, Gibson & Boivin, 2014), and the results found in the present study are congruent with the overarching notion that with age comes certain benefits to parenting and well-being.

The significant effect of having the father in the child's household on the likelihood of poverty status is noteworthy. In conjunction with recent findings that marital status did not protect against negative outcomes related to young maternal age (Addo, Sassler & Williams, 2016), our results present an interesting juxtaposition. One explanation may be that the mere presence of the father in the home (cohabitation), versus legal marriage itself, serves as a potentially protective factor for young mothers at risk of poverty. It may point to a buffering effect of added resources, including monetary and psychosocial supports, that protect against the mechanisms usually responsible for negative outcomes associated with young motherhood. The finding that having the child's father in the home predicted significantly higher scores on the measure of home environment and parenting also suggests that cohabitation with the father provides certain benefits to mothers that allow them to increase the emotional support and cognitive stimulation conferred to their children. The present study's results echo past findings that showed paternal support has a positive effect on mothers' parenting competence (Roye & Balk, 1996).

The significant difference in poverty status depending on race/ethnicity is consistent with previous findings in U.S. studies that show minority race/ethnicity (e.g., Hispanic, Black in this sample) is associated with issues related to poverty (see Lin & Harris, 2009). Present findings are also consistent with those of Addo, Sassler, and Williams (2016) which illustrated that, despite evidence of some benefits of delaying child-bearing in Black mothers, their children continued to inherit disadvantages due to other factors related to racial identity. The findings of a significant effect of Hispanic race/ethnicity on both educational attainment and poverty status is

unsurprising, as education and poverty are highly related (Ladd, 2012). In contrast, the marginal effect of Black race/ethnicity on educational attainment in a positive direction provides an interesting point of discussion. Although this effect is weak, it may be indicative of certain protective factors associated with familial and cultural norms for black mothers such as strong family network (Chase-Lansdale, Brooks-Gunn & Zamsky, 1994). As some posit that the ability to advance education in the context of early parenthood likely depends on quality of social resources and support (Assini-Meytin & Green, 2015), perhaps the cultural norm within African-American communities to prioritize family closeness and support acts to promote mothers' ability to meet educational milestones (see Taylor, Budescu, Gebre & Hodzic, 2014 for a related study). It is imperative to note that the between-group differences demonstrated here should not be attributed to any characteristics inherent to racial/ethnic identity, but rather, they are evidence of systematic and covert sources of oppression and racism that are persistent in American society (see Ayón, Messing, Gurrola & Valencia-Garcia, 2017 for a discussion of forms of discrimination). The marginalization of non-White identities by dominant patriarchal systems and individuals should be conceptualized as a driving force behind these observed differences. Further exploration of the nuances of socioeconomic and familial influences across different ethnic communities is warranted to clarify and expand upon our results.

Future directions

This study 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, or if the effects observed in this study would also be found 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.

Additionally, it would be useful for future studies to examine paternal cohabitation as a time-varying factor in order to assess at what maternal ages protective effects are most apparent and if there may be certain paternal ages at which a father's involvement may in fact be to the mother or child's detriment. For example, Garfield and colleagues (2014) found that resident fathers are more likely to experience greater depressive symptoms during their children's early years. Such evidence highlights the need for additional research that delves into paternal effects as a function of father, mother, and child ages.

With current trends clearly signaling more women delaying childbearing (Mathews & 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, Hubbard & Murphy, 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

As with all studies, the present study should be considered in light of some of its limitations. First, we use oversimplified categorizations of race/ethnicity here to identify broad differences among mothers even though racial identity is a complex socially-constructed concept. Future work should delve deeper 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 poverty status 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. Inclusion of additional variables that highlight specific indicators of financial strain (e.g., struggling to afford basic necessities) and continuous markers of economic health would provide further clarity in regards to socioeconomic outcomes related to maternal age at first birth.

Second, although mother-child interaction is arguably of utmost importance during a child's first few years of life (Maggi, Irwin, Siddiqi & Hertzman, 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 still so young. While the present findings for home and parent-child interaction characteristics for children age 6-9 are noteworthy, 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 verbiage.

Further, 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 exploring 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 examining mental health status trends and outcomes for mothers across the childbearing age range, and in particular for mothers who enter parenthood in early adulthood.

Figures

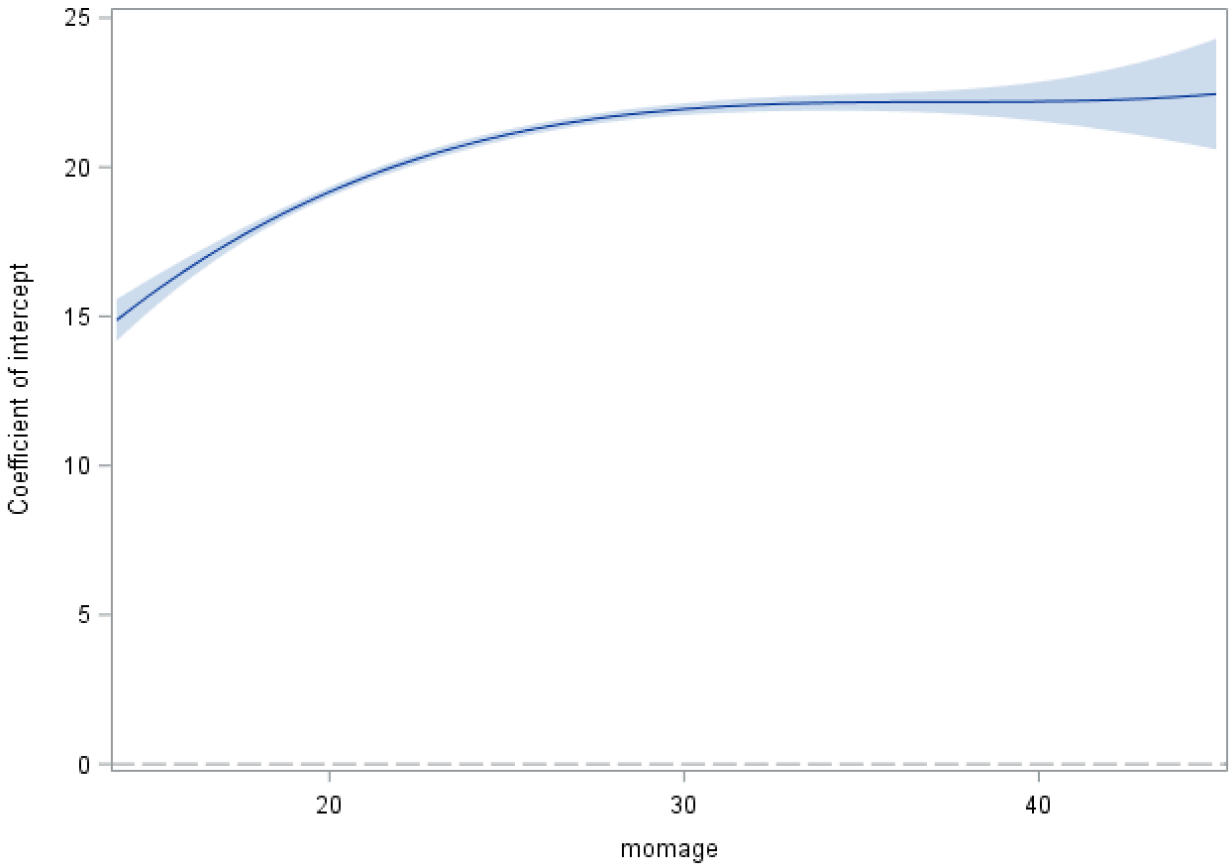

Figure 1. Effects of maternal age at first birth on HOME-SF scores when race/ethnicity and father cohabitation variables are coded 0, with 95% confidence interval indicated by shaded region around curve.

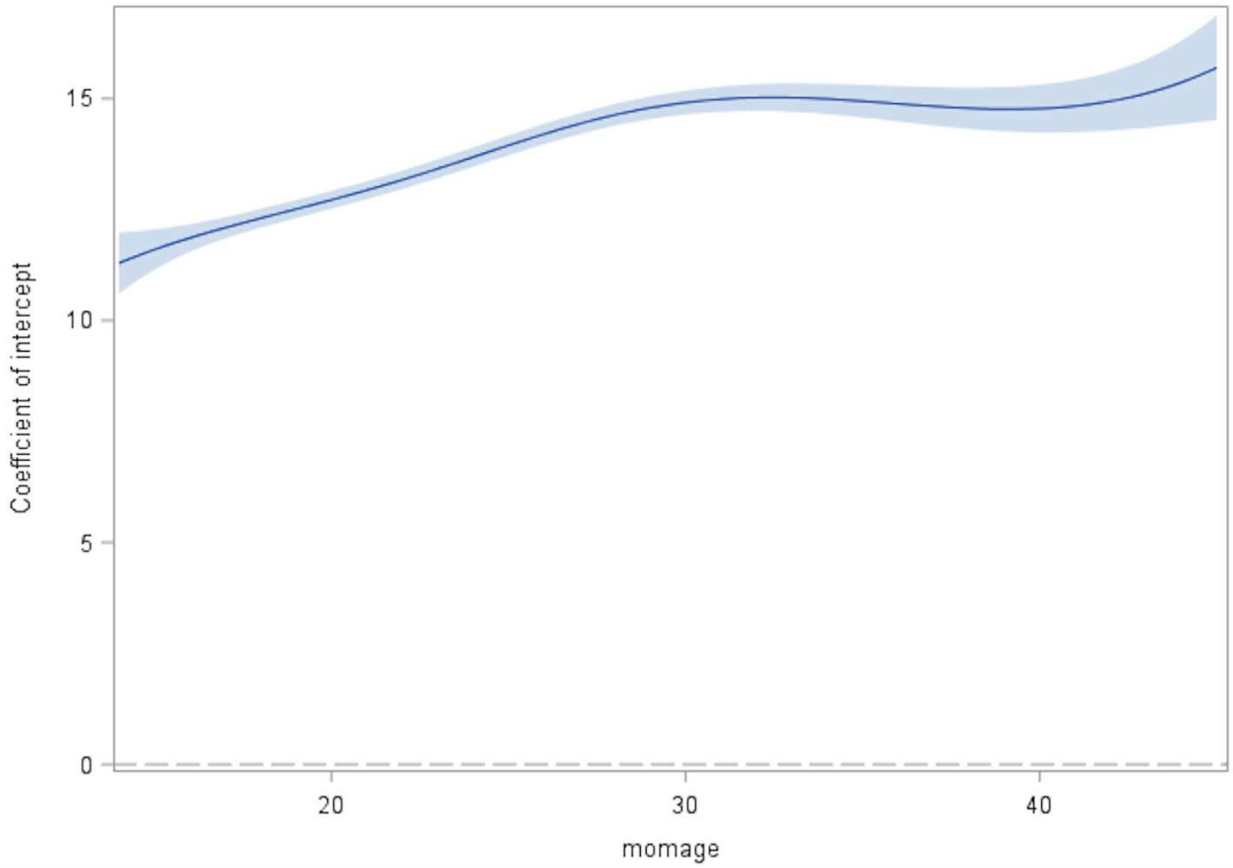

Figure 2. Effects of maternal age at highest grade completed when race/ethnicity and father cohabitation variables are coded 0, with 95% confidence interval indicated by shaded region around curve

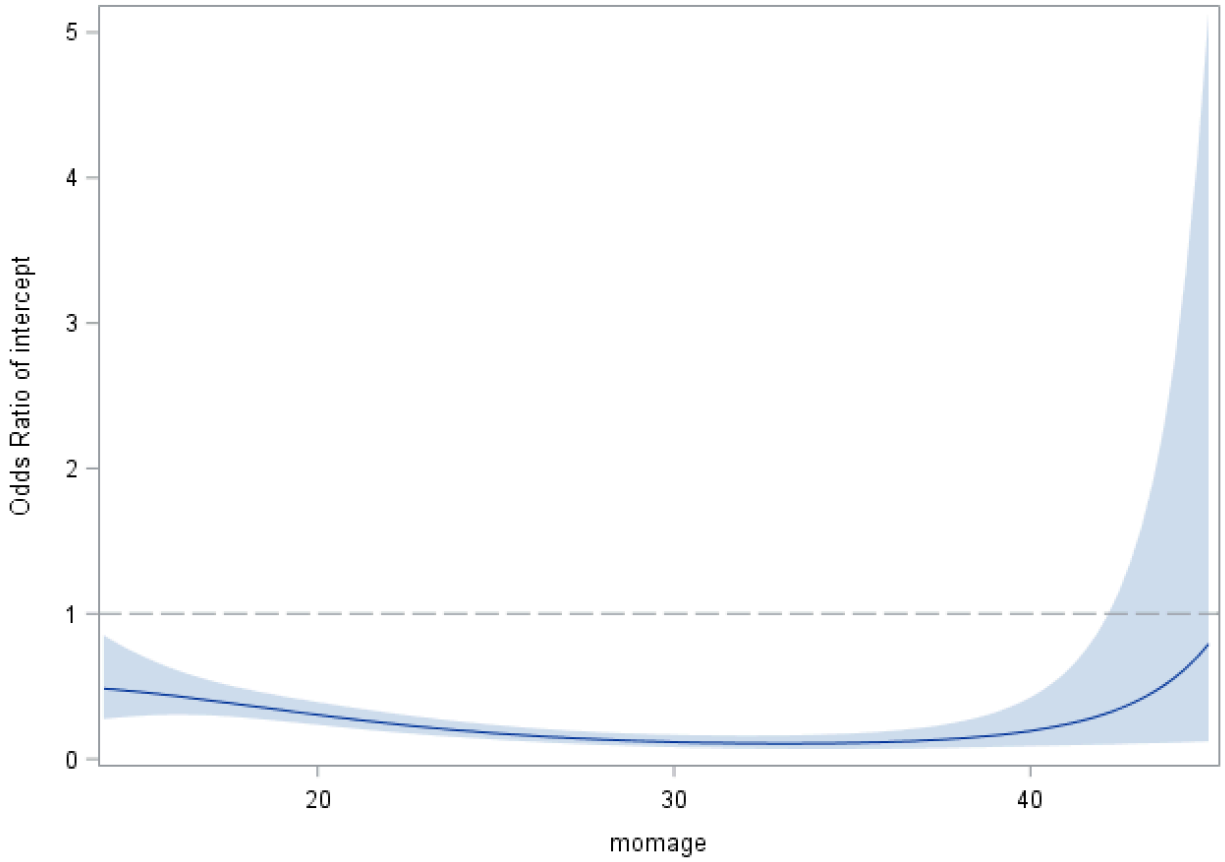

Figure 3. Effects of maternal age at first birth on the odds of poverty status when race/ethnicity and father cohabitation variables are coded 0, with 95% confidence interval indicated by shaded region around curve

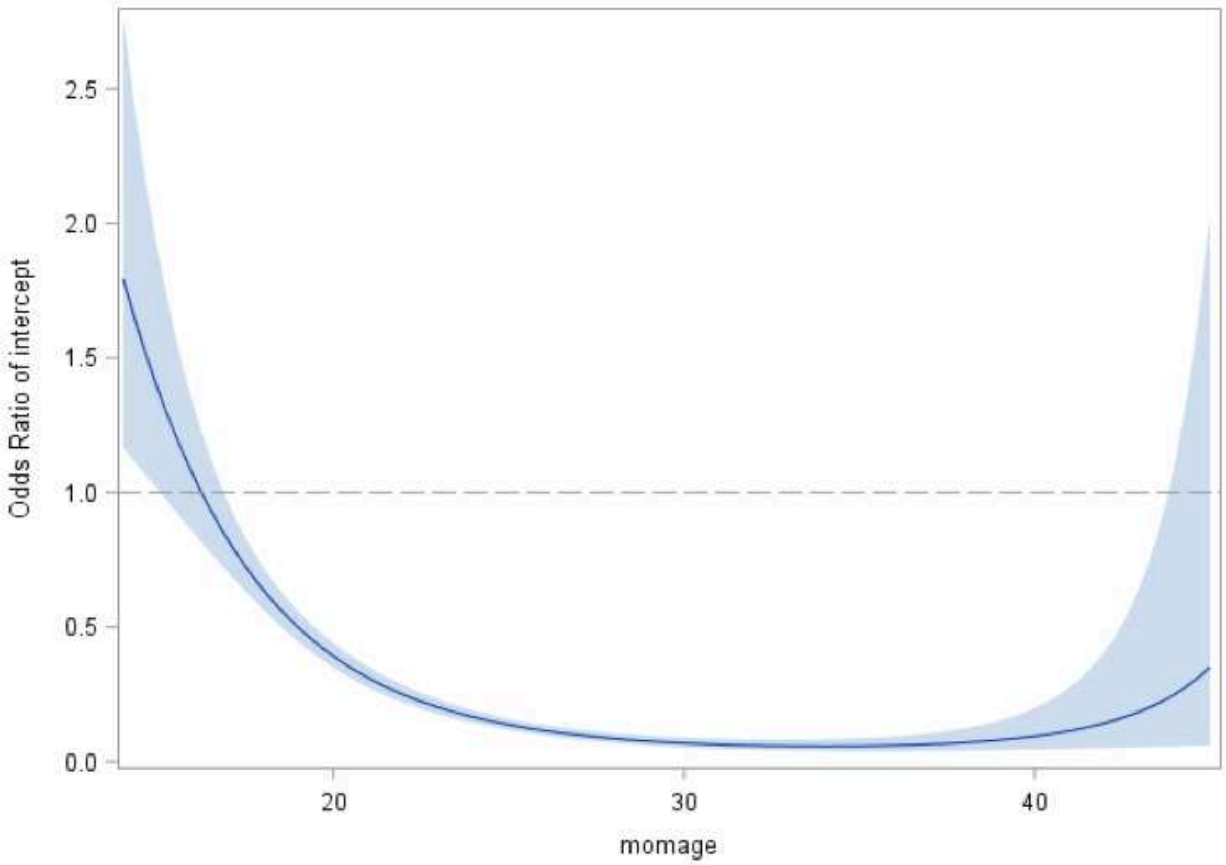

Figure 4. Effects of maternal age at first birth on the odds of poverty status using entire sample of mothers, with 95% confidence interval indicated by shaded region around curve

Tables

Table 1.
Fixed Effects of relationship between maternal age and odds of poverty status

Covariate	b	S.E.	Z	p
Dad	-.708	.124	-5.715	<.001***
Black	.893	.139	6.44	<.001***
Hispanic	.618	.151	4.104	<.001***

*p<0.05; **p<.01; ***p<.001

Table 2.

Fixed effects of relationship between maternal age and highest grade completed

Covariate	b	S.E.	Z	p
Dad	.257	0.099	2.61	.009**
Black	.196	.104	1.88	.0596
Hispanic	-.701	.135	-5.199	<.001***

*p<0.05; **p<.01; ***p<.001

Table 3.

Fixed Effects of relationship between maternal age and HOME-SF scores

Covariate	b	S.E.	Z	p
Dad	1.962	.129	15.25	<.001***
Black	-1.54	.145	-10.647	<.001***
Hispanic	-1.197	.160	-7.501	<.001***

*p<0.05; **p<.01; ***p<.001

Table 4.
Number of mothers at each age

Maternal Age at First Birth	n	Percent
14	9	0.27
15	38	1.14
16	104	3.12
17	195	5.85
18	243	7.29
19	337	10.10
20	329	9.87
21	248	7.44
22	225	6.75
23	208	6.24
24	186	5.58
25	163	4.89
26	178	5.34
27	133	3.99
28	133	3.99
29	97	2.91
30	106	3.18
31	94	2.82
32	77	2.31
33	47	1.41
34	45	1.35
35	45	1.35
36	28	0.84
37	14	0.42
38	13	0.39
39	17	0.51
40	8	0.24
41	8	0.24
42	4	0.12
43	1	0.03
45	2	0.06

References

Addo, F. R., Sassler, S., & Williams, K. (2016). Reexamining the Association of Maternal Age and Marital Status at First Birth with Youth Educational Attainment. *Journal of Marriage and Family*, *78*(5), 1252-1268.

Aitken, Z., Hewitt, B., Keogh, L., LaMontagne, A. D., Bentley, R., & Kavanagh, A. M. (2016). Young maternal age at first birth and mental health later in life: does the association vary by birth cohort? *Social Science & Medicine*, *157*, 9-17.

Akaike, H. (1974). A new look at the statistical model identification. *IEEE transactions on automatic control*, *19*(6), 716-723.

Assini-Meytin, L. C., & Green, K. M. (2015). Long-term consequences of adolescent parenthood among African-American urban youth: a propensity score matching approach. *Journal of Adolescent Health*, *56*(5), 529-535.

Ayón, C., Messing, J. T., Gurrola, M., & Valencia-Garcia, D. (2017). The Oppression of Latina Mothers: Experiences of Exploitation, Violence, Marginalization, Cultural Imperialism, and Powerlessness in Their Everyday Lives. *Violence against women*, 1077801217724451.

Baharudin, R., & Luster, T. (1998). Factors related to the quality of the home environment and children's achievement. *Journal of Family Issues*, *19*(4), 375-403.

Becker, G. S., Hubbard, W. H., & Murphy, K. M. (2010). The market for college graduates and the worldwide boom in higher education of women. *The American Economic Review*, *100*(2), 229.

Bornstein, M. H., Putnick, D. L., Suwalsky, J. T., & Gini, M. (2006). Maternal chronological

age, prenatal and perinatal history, social support, and parenting of infants. *Child development*, *77*(4), 875-892.

Bradley, R. H., & Caldwell, B. M. (1979). Home observation for measurement of the environment: a revision of the preschool scale. *American journal of mental deficiency*.

Brooks-Gunn, J., & Furstenberg, F. F. (1986). The children of adolescent mothers: Physical, academic, and psychological outcomes. *Developmental review*, *6*(3), 224-251.

Bureau of Labor Statistics, U.S. Department of Labor. National Longitudinal Survey of Youth 1979 cohort, 1979-2010 (rounds 1-24). Produced and distributed by the Center for Human Resource Research, The Ohio State University. Columbus, OH: 2012.

Camberis, A. L., McMahon, C. A., Gibson, F. L., & Boivin, J. (2014). Age, psychological maturity, and the transition to motherhood among English-speaking Australian women in a metropolitan area. *Developmental psychology*, *50*(8), 2154.

Caughy, M. O. B., DiPietro, J. A., & Strobino, D. M. (1994). Day-Care Participation as a Protective Factor in the Cognitive Development of Low-Income Children. *Child development*, *65*(2), 457-471.

Centers for Disease Control and Prevention. (2010. *Reproductive health: Teen pregnancy.* Retrieved from https://www.cdc.gov/teenpregnancy/about/ Feb. 2017.

Chase-Lansdale, P. L., Brooks-Gunn, J., & Zamsky, E. S. (1994). Young African-American multigenerational families in poverty: Quality of mothering and grandmothering. *Child development*, *65*(2), 373-393.

Chen, X., Wen, S. W., Fleming, N., Demissie, K., Rhoads, G. G. & Walker, M. (2007) Teenage pregnancy and adverse birth outcomes: A large population based retrospective cohort study. *International Journal of Epidemiology, 36*(2), 368-73. doi: 10.1093/ije/dyl284

Chevalier, A. & Viitanen, T. K. (2003) The long-run labour market consequences of teenage motherhood in Britain. Journal of Population Economics, 16, 323-343. doi: 10.1007/s001480200125

Driscoll, A. (2014). Adult outcomes of teen mothers across birth cohorts. *Demographic Research*, *30*, 1277-1292.

Ellis, B. J., Bates, J. E., Dodge, K. A., Fergusson, D. M., John Horwood, L., Pettit, G. S., & Woodward, L. (2003). Does father absence place daughters at special risk for early sexual activity and teenage pregnancy? *Child development*, *74*(3), 801-821.

Fergusson, D. M., & Woodward, L. J. (1999). Maternal age and educational and psychosocial outcomes in early adulthood. *Journal of Child Psychology and Psychiatry*, *40*(3), 479-489.

Ganchimeg, T., Ota, E., Morisaki, N., Laopaiboon, M., Lumbiganon, P., Zhang, J., ... & Vogel, J. P. (2014). Pregnancy and childbirth outcomes among adolescent mothers: a World Health Organization multicountry study. *BJOG: An International Journal of Obstetrics & Gynaecology*, *121*(s1), 40-48.

Gibb, S. J., Fergusson, D. M., Horwood, J., & Boden, J. M. (2014) Early motherhood and long-term economic outcomes: Findings from a 30-year longitudinal study. *Journal of Research on Adolescence, 25(1)*, 162-172. doi: 10.1111/jora.12122

Grimshaw, D., & Rubery, J. (2015). The motherhood pay gap: A review of the issues, theory and international evidence. *Conditions of Work and Employment Series*.

Hawkes, D. & Joshi, H. (2012) Age at motherhood and child development: evidence from the UK millennium cohort. National Institute Economic Review, 222(1), 52-66. doi: 10.1177/002795011222200105

Heflin, C. M., & Pattillo, M. (2006). Poverty in the family: Race, siblings, and socioeconomic heterogeneity. *Social Science Research*, *35*(4), 804-822.

Hobcraft, J. & Kiernan, K. (2001) Childhood poverty, early motherhood and adult social exclusion. British Journal of Sociology, 52(3), 495-517. doi: 10.1080/00071310120071151

Hofferth SL. The children of teen childbearers. In: Hofferth SL, Hayes CD, editors. Risking the future. National Academy Press; Washington, DC: 1987. pp. 174–206

Jaffee, S. R., Caspi, A., Moffitt, T. E., Taylor, A., & Dickson, N. (2001). Predicting early fatherhood and whether young fathers live with their children: Prospective findings and policy reconsiderations. *Journal of Child Psychology and Psychiatry*, *42*(6), 803-815.

Karreman, A., Van Tuijl, C., van Aken, M. A., & Deković, M. (2006). Parenting and self-regulation in preschoolers: a meta-analysis. *Infant and Child Development*, *15*(6), 561-579.

Ladd, H. F. (2012). Education and poverty: Confronting the evidence. *Journal of Policy Analysis and Management*, *31*(2), 203-227.

Lanza, S. T., Vasilenko, S. A., & Russell, M. A. (2016). Time-varying effect modeling to address new questions in behavioral research: Examples in marijuana use. *Psychology of addictive behaviors*, *30*(8), 939.

Lawylor, D. A., & Shaw, M. (2002) Too much too young? Teenage pregnancy is not a public health problem. *International Journal of Epidemiology, 31*, 552-554.

Lee, D. (2010). The early socioeconomic effects of teenage childbearing: A propensity score matching approach. *Demographic Research*, *23*, 697-736.

Lin, A. C., & Harris, D. R. (2009). The colors of poverty: Why racial & ethnic disparities

persist. *Ann Arbor*, *1001*(48109), 43091.

Lomanowska, A. M., Boivin, M., Hertzman, C., & Fleming, A. S. (2017). Parenting begets parenting: A neurobiological perspective on early adversity and the transmission of parenting styles across generations. *Neuroscience*, *342*, 120-139.

Maggi, S., Irwin, L. J., Siddiqi, A., & Hertzman, C. (2010). The social determinants of early child development: an overview. *Journal of paediatrics and child health*, *46*(11), 627-635.

Mahavarkar, S. H., Madhu, C. K., & Mule, V. D. (2008) A comparative study of teenage pregnancy. *Journal of Obstetrics and Gynaecology, 20(6),* 604-607. doi: 10.1080/01443610802281831

Mathews, T. J., & Hamilton, B. E. (2016). Mean Age of Mothers is on the Rise: United States, 2000-2014. *NCHS data brief*, (232), 1-8.

Miller, A. R. (2011). The effects of motherhood timing on career path. *Journal of Population Economics*, *24*(3), 1071-1100.

Mott, F. L. (2004). The utility of the HOME-SF scale for child development research in a large national longitudinal survey: the National Longitudinal Survey of Youth 1979 cohort. *Parenting*, *4*(2-3), 259-270.

Noll, J. G. & Shenk, C. E. (2013) Teen birth rates in sexually abused and neglected females. *Pediatrics, 131(4),* e1181-e1187. doi: 10.1542/peds.2012-3072.

Orth, U. (2017). The Family Environment in Early Childhood Has a Long-Term Effect on Self-Esteem: A Longitudinal Study from Birth to Age 27 Years. *Journal of personality and social psychology*.

Perry, N. B., Nelson, J. A., Swingler, M. M., Leerkes, E. M., Calkins, S. D., Marcovitch, S., &

O'brien, M. (2013). The relation between maternal emotional support and child physiological regulation across the preschool years. *Developmental psychobiology*, *55*(4), 382-394.

Putnam-Hornstein, E., Cederbaum, J. A., King, B., Eastman, A. L., & Trickett, P. K. (2015). A population-level and longitudinal study of adolescent mothers and intergenerational maltreatment. *American journal of epidemiology*, *181*(7), 496-503.

Ramchandani, P. G., Domoney, J., Sethna, V., Psychogiou, L., Vlachos, H., & Murray, L. (2013). Do early father–infant interactions predict the onset of externalising behaviours in young children? Findings from a longitudinal cohort study. *Journal of Child Psychology and Psychiatry*, *54*(1), 56-64.

Roye, C. F., & Balk, S. J. (1996). The relationship of partner support to outcomes for teenage mothers and their children: A review. *The Journal of Adolescent Health, 19*(2), 86–93.

Schwarz, G. (1978). Estimating the dimension of a model. *The annals of statistics*, *6*(2), 461-464.

Sedgh G, Finer LB, Bankole A, Eilers MA, Singh S. (2015). Adolescent pregnancy, birth, and abortion rates across countries: levels and recent trends. *J Adolesc Health, 56*(2):223-30.

Smith, M. (2011). Measures for assessing parenting in research and practice. *Child and Adolescent Mental Health*, *16*(3), 158-166.

Smith, S. (2002) Too much too young? In Nepal, more a case of too little, too young. *International Journal of Epidemiology, 31*, 557-558.

Tan, X., Shiyko, M. P., Li, R., Li, Y., & Dierker, L. (2012). A time-varying effect model for intensive longitudinal data. *Psychological methods*, *17*(1), 61.

Taylor, R. D., Budescu, M., Gebre, A., & Hodzic, I. (2014). Family financial pressure and

maternal and adolescent socioemotional adjustment: Moderating effects of kin social support in low income African American families. *Journal of Child and Family Studies*, *23*(2), 242-254.

Unger, J. A. M., & De Luca, R. V. (2014). The relationship between childhood physical abuse and adult attachment styles. *Journal of family violence*, *29*(3), 223-234.

U.S. Department of Education. (2016). Institute of Education Sciences, National Center for Education Statistics. Retrieved from https://nces.ed.gov/programs/coe/indicator_cbc.asp.

Williams, K., Sassler, S., Addo, F., & Frech, A. (2015). First-birth timing, marital history, and women's health at midlife. *Journal of health and social behavior*, *56*(4), 514-533.