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Race Differences in Linking Family Formation Transitions to Women's Mortality

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Abstract

We examine how the timing and sequencing of first marriage and childbirth are related to mortality for a cohort of 4,988 white and black women born between 1922 and 1937 from the National Longitudinal Survey of Mature Women. We use Cox proportional hazard models to estimate race differences in the association between family formation transitions and mortality. Although we find no relationships between marital histories and longevity, we do find that having children, the timing of first birth, and the sequencing of childbirth and marriage are associated with mortality. White women who had children lived longer than those who had none, but the opposite was found for black women. The effects of birth timing also differed by race, delaying first birth to older ages was protective for white women but not black women. These results underscore the importance of social context in the study of life course transitions.

Life course researchers have demonstrated the importance of linking early life experiences to later life health outcomes (Shanahan 2000). Of particular significance are the transitions that comprise entry into a new stage of the life course, from adolescent to adult, or from worker to retiree, for example. The significance of transitional processes lies in both their predictability and in their heterogeneity (George 1993). Marriage and childbearing are two key family formation events that signify the transition to adulthood, but differ in their timing and sequencing, allowing us to examine how transitional structure is related to later life health and mortality.

Race disparities in cultural experiences and life course opportunities during this transitional period may give different meaning to these life course events. Racial differences in fertility and family formation patterns are well-documented (Bryant et al. 2010). By extension, race differences in how these family formation events shape later life health and mortality would also be expected, particularly for women whose early lives had been spent in segregated and unequal circumstances. Numerous studies have investigated how mother's age at birth influences infant mortality (Fraser, Brockert, and Ward 1995; Furstenberg 1976; Geronimus 1987) and the implications of mother's marital status for childhood health and well-being

(Brown 2004; Dawson 1991). However, researchers have rarely been able to address the lifetime connection between the events that define family formation and late life health and mortality.

Using data from the original mature women cohort of the National Longitudinal Surveys, recently matched mortality data from the National Death Index and the Social Security Death Index, and Cox proportional hazard models, we demonstrate the association between adult mortality and temporal aspects of early life family transitions for a national sample of white and black women born from 1922 to 1937. Since the relationship between the timing of these transitions and mortality may partially reflect selection into transitional pathways, we control for childhood family structure and socioeconomic status (SES). Mortality rates for women who are wives and mothers also have been associated with better health in older age. Therefore, we include indicators of mid-life family characteristics and SES, such as subsequent transitions out of or into marriage, additional children, employment, and household income, as likely confounding variables. We find race differences in these associations and demonstrate their persistence despite inclusion of covariates. Our findings underscore the importance of considering cultural context for understanding life course processes.

Background

Race, Health, and Life Course Transitions

Many sociologists have adopted a ‘life course’ perspective as a means of contextualizing personal experiences within a normative social framework, recognizing that the context may vary across cultures and historical periods (Kohli 1986; Shanahan 2000). Differences in the nature, timing, and sequencing of events that signal a new stage; differences across cohorts, subpopulations, and historical periods; and changing definitions of what constitutes a family or a marriage are indicative of multiple and dynamic social structures (Elder 1977; O’Rand and Krecker 1990). Within the life course perspective, socioeconomic status (SES) plays a key role in connecting early life circumstances to later life outcomes. Sometimes referred to as a fundamental cause (Link and Phelan 1995), SES shapes health outcomes across the life course through the mediating influences of health behaviors, health knowledge, and health care, among other factors. Whether SES is measured as education, income, wealth, or occupation, those with more financial resources and higher human capital enjoy substantially better health (Kim and Durden 2007; Smith 2007).

Cumulative disadvantage theory suggests that early life inequalities set individuals on divergent life trajectories whereby those experiencing early life hardships are at higher risk of experiencing additional adversities that result in worse health in late life (Ferraro and Shippee 2009; Willson and Shuey 2016). Studies that attempt to link later life health to childhood SES have noted that the effect of early childhood circumstances on health in young adulthood is not entirely mediated by factors linked to achievement, such as education and employment (Preston and Taubman 1994).

Racial differences in the accumulation of negative health consequences are also central to Geronimus’ (1987; 1991; 1996) weathering hypothesis. She argues that negative health

consequences accumulate more quickly for blacks, in part because of the increased stress and discrimination experienced by black women. More recent studies examining racial differences in the cumulative disadvantages for late life health have found mixed results. While the association of adult income and wealth with health was similar for whites and blacks (Shuey and Willson 2008), there are differential effects by race in the association of education and marital status with health (Dupre 2016). Also, racial differences in the magnitude of the effects of early life SES for later life health have been found (Shuey and Willson 2008).

For the cohorts of women born between the two world wars, family roles were a core component of the transition to adulthood. Schooling beyond high school was rare (Lichter et al. 1992), and employment was often a temporary bridge between school and marriage, with financial security tied to marriage. However, this description draws primarily from the lives of white, middle class women, whereas the social organization of these transitions is rooted in culture and experience (Farley and Bianchi 1987; Geronimus 1987). For these women, racial stratification and pervasive discrimination were reflected in their different life experiences and circumstances (Odum 1936). School segregation and low household income further limited educational opportunities and made working an economic necessity for black women. Given these disparate circumstances, black and white women from these cohorts faced segregated pathways in making early life course transitions, with long-term implications for their socioeconomic status and health.

Marital and Childbearing Biographies and Health

Marriage and Health—The health premium enjoyed by married women and men has been documented for many health outcomes, including chronic diseases (Dupre and Meadows 2007; Dupre and Nelson 2016; Zhang and Hayward 2006), activities of daily living (Hughes and Waite 2009), self-rated health (Lillard and Panis 1996; Umberson et al. 2006), well-being (Hawkins and Booth 2005), and longevity (Kaplan and Kronick 2006; Lillard and Waite 1995). Age differences in the strength of the marriage premium suggest that the effect of marriage may cumulate over time, with marriages of longer durations providing greater benefits (Lillard and Waite 1995).

Previous research most often looked at how health outcomes differ by marital status, although some studies also examined whether changes in marital status were associated with changes in health (Shor et al. 2012). However, research on the long-term health implications of marriage, marital formation, and dissolution are less common (Hughes and Waite 2009). Specific aspects of marital histories such as being married more than once, experiencing a marital dissolution, or marrying before age 25 have been linked to higher levels of disability, poorer self-rated health, and higher prevalence of cardiovascular disease (Dupre and Meadows 2007; Zhang and Hayward 2006). Longer marriages or spending more time married has also been associated with better health (Brockmann and Klein 2004). Rarer still are studies that look at both status and transitional effects. These studies find that marital loss, shorter durations in marriage, and longer spells of being unmarried are associated with worse health (Hughes and Waite 2009; Dupre 2016).

The importance of marriage for women's health has been attributed primarily to an economic effect, with married women having higher SES than unmarried women (Smock, Manning, and Gupta 1999). For white women in these cohorts, financial security at older ages was associated with either stable marriages or stable careers. In contrast, the financial security of black women was based on their work, not their marital histories (Willson and Hardy 2002).

Childbirth, Age at First Birth, and Health

Childbirth is a second family formation event related to women's health. Childbirth carries biological demands of in utero development, health risks of childbirth, and social implications for different stages of the life course. Late births may be related to lower mortality because late births may be associated with slower biological aging according to evolutionary theories (Smith, Mineau, and Bean 2002). Many studies of childbearing timing focus on births that occur in adolescence, generally reporting negative health and social effects from adolescent births (Furstenberg 1976; Chen et al. 2007). Studies that have examined childbirth timing outside of adolescence suggest a negative relationship, with longevity being associated with delaying first birth to older ages (Grundy and Kravdal 2007; Mirowsky 2005; Henretta 2007). While most studies of childbearing and health focus on women, studies of men find similar results, suggesting these relationships have a social as well as biological component (Grundy and Kravdal 2007).

The rates of early childbearing differ significantly for whites and blacks, suggesting the social processes surrounding these events also may vary by race (Martin et al. 2015). Studies investigating racial differences in women's health and mortality by age at first birth have found inconsistent results. One study examining mortality found that delaying first birth to later ages was detrimental for black women (Spence and Eberstein 2010). Another study found that delaying childbearing beyond age 24 was associated with better midlife health for both whites and blacks, although adolescent childbearing was associated with worse health in midlife for blacks but not whites (Williams et al. 2015).

In addition to the timing of first birth, parity also has been linked to late life health. Higher parity may be associated with better health because those who are healthy enough to have multiple births are already positively selected on health. However, high parity among black women has been associated with poorer health (Sudha, Mutran, Williams, and Suchindran 2006) and reduced longevity (Benamins, Hummer, Eberstein, and Nam 2004; Spence and Eberstein 2010). One confounding factor is that parity is higher among women whose pregnancies occur prior to their first marriages and/or at a young age; for these women, average rates of subsequent fertility are elevated and birth intervals are shorter (Bumpass et al. 1978).

Though childlessness was uncommon for these cohorts, some studies have linked childlessness to poor nutrition and health, especially among blacks (Cutright and Shorter 1979). Having children may alter health behaviors, with parents being less likely to engage in risky behavior such as smoking and alcohol abuse (Grundy and Kravdal 2007). At older ages, mothers may turn to their children for social support and informal caregiving, while the social support networks for the childless are more limited (Wolf 1994). Therefore,

having children is restricted only to those women healthy enough to have children and may confer further benefits by motivating positive health behaviors and providing a source of social support in old age.

Sequencing of Marriage and Childbirth

The age at first marriage and childbirth may provide further leverage in explaining how early life course circumstances shape women's adult pathways and through those pathways, health and mortality. The sequence of these events—whether marriage occurs before or after the birth—is also important. A pre-marital pregnancy may lead to marriage, ensuring that the sequence matches social expectations. Anxiety about pregnancy often led to a kind of oral contract between partners. Women agreed to sex if men promised to marry should pregnancy occur. Societal expectations reinforced the pressure on boyfriends to marry their pregnant girlfriends, and most did in what came to be known as 'shotgun' weddings (Furstenberg 1988). However, these weddings were much more common among whites than blacks, arguably because the social stigma was more severe and the ramifications more consequential for the former (England et al. 2012).

Research on more recent cohorts addressed increasing rates of teen pregnancy and an escalation in rates of childhood and adult poverty in the 1960s and 1970s. These studies argued for social policy to address teen pregnancy as well as the social and economic disadvantages subsequently experienced by young, unwed mothers and their children (Furstenberg, 1976). However, questions about the influence of cultural contexts and experiences led to hypotheses that early life disadvantages potentially precipitated outcomes such as teen pregnancy, and that cultural differences could produce dissimilar social and practical consequences for mothers and children (Geronimus 1987; 1991). Noting that the timing of first births may be conditioned by both cultural practice and observed health outcomes, Geronimus (1987) proposed that for African American women, early births may provide certain advantages, including higher rates of infant survival and better access to family support.

Growing up in single mother households is associated with lower rates of early marriage (Avery, Goldscheider, and Speare 1992) and was more common for black than white girls. Additionally, sexual maturity was more closely associated with motherhood among blacks (Gabriel and McAnarney 1983), in part because young black women had limited prospects for marriage (Wilson and Neckerman 1987). For the cohorts in our study, the prevalence of premarital conception and premarital births was 3–4 and 5–6 times as high, respectively, for black versus white women (Bachu 1999; England, Wu, and Shafer 2013). These empirical patterns suggest different social norms that recognized how opportunities and constraints were structured by race. Therefore, race may moderate the influence of these factors on later life health and mortality.

Focus of Current Study

Our study examines how early life events of family formation shape survival to older ages for women from different races living in two different Americas. Previous research has reported race differences in many family, SES, and health characteristics. Our primary

interest is less on these compositional differences and more on how the long-term relationship between early life events and mortality may differ by race. A particularly relevant study by Spence and Eberstein (2009) focused on the role of parity in predicting later life mortality. Using a subsample of the same NLS cohort, their findings supported Geronimus' 'weathering' hypothesis. Delaying a first childbirth to a relatively 'late' age was associated with higher mortality among African American women, whereas having a first child at a relatively 'early' age was associated with higher mortality rates among white women. Because they defined 'early' and 'late' with race-specific age boundaries and calculated their estimates separately for blacks and whites, they were unable to directly test race differences in associations.

We build on their findings by incorporating timing information on the transition into marriage and directly testing for race differences in associations by designating 'early' versus 'late' transitions using the same chronological age for blacks and whites. In addition, we are able to take advantage of recently matched mortality data that provides death dates through March 2012, regardless of whether respondents remained active in the survey. These data allow a finer grained ordering of longevity by providing exact birth and death dates. Finally, because we utilize the full sample of black and white respondents, a longer timer period of observation (by 2012, the age range of surviving respondents was approximately 75–90), and two administrative sources of death information, our estimates are based on recorded deaths for close to half of the sample.

Given that timing and sequencing are at the center of our study, we perform our analysis on the full sample, including never married and childless women, and then shift to a subset that includes almost 88 percent of the full sample-- women who were ever-married mothers --for the remainder of our analysis. Further, we control for the structure of their family of origin and early life SES and include information on subsequent family formation sequences. We thereby account for key aspects of both the family-of origin and the respondent's family throughout mid-life and into older age. We then investigate how effects of these earlier life events may confound the relationship between mid-life differences in SES and health. If this transition were highly standardized for white women of this era (Shanahan 2000), then non-normative timing and in particular, non-normative sequencing would carry significant disadvantages and/or signal unobserved health problems. The social stigma experience by women who have out-of-wedlock births may drastically alter their marriage prospects, and less favorable marriages may have long-term health consequences. While white women who conceived out of wedlock were likely to marry before the birth, black women were more likely to have a premarital conception and less likely to enter post conception marriages. Therefore, early or out of sequence childbirth may carry fewer negative consequences for blacks given different race-specific norms (England, Shafer, and Wu 2012).

Hypotheses

Drawing on the life course framework, the weathering hypothesis, cumulative disadvantage theories, and previous research, we propose several hypotheses relating the timing and sequencing of first birth and marriage to women's mortality. Family formation timing and sequencing may be associated with mid-life characteristics, especially SES, making it

necessary to control for these factors. Nevertheless the cumulative disadvantage paradigm suggests these early life events will be associated with mortality. However, since the economic benefits of marriage were stronger for white than black women, marital timing may matter less for black women.

H1a: We hypothesize that mortality is higher for white women who become wives later or earlier than the modal ages of 19–24.

H1b: We hypothesize the timing of marriage will be less consequential and therefore not associated with mortality for black women.

Second, researchers have reported that women who delay first births have a health advantage, while very young mothers are at a health disadvantage. However, the relationship between health and age at first birth is confounded by differences in childhood and adult SES. Therefore, although women who delayed motherhood should have a mortality advantage, while women who had births at younger ages should be at a mortality disadvantage, once SES is controlled, these differences in mortality rates should narrow. In contrast, Geronimus' weathering hypothesis suggests that early births may be advantageous for black women, with negative health consequences associated with delayed births, as the weathering effect itself accumulates.

H2a: We hypothesize that white women who have their first child at older ages will have lower rates of mortality.

H2b: Among black women, we hypothesize that women with births at younger ages will have lower rates of mortality.

The idealized family formation sequencing for young women in these cohorts was marriage before childbirth. Having children before marriage leads to lower SES and, perhaps, to lower quality marriages after childbirth. Additionally, given the racial differences in the social stigma associated with unwed births as well as the expectation that having a child would reduce marriage prospects more for white women than black women, we anticipate finding racial differences in the association of child birth timing and health.

H3a: We hypothesize that white women who experience childbirth before marriage will have higher rates of mortality.

H3b: We hypothesize that black women who experience childbirth before marriage will not have higher mortality rates.

Data and Methods

Data

Data for these analyses come from the National Longitudinal Survey of Mature Women (NLS-MW), a nationally representative sample of 5,083 women who were aged 30–44 when the survey was initiated in 1967. These women were re-interviewed regularly until 2003, and the survey maintained very high response rates throughout this 35-year period; after 20 years, retention was about 70 percent of surviving respondents. By the end of the survey, close to 60 percent of the survivors were still participating. The original sample was stratified by race, ensuring a sufficiently large sample of black women to allow race

comparisons. Having a sample defined by this 15-year series of birth cohorts has both advantages and disadvantages. The advantages include some degree of similarity in early life historical context and that the current age of these women has surpassed average life expectancy at birth. Therefore, we have a more complete mortality history of the cohort. Hazard models are most suited to events that are commonly observed for the sample. However, the age at initial observation also means that the most severe negative health consequences of childbearing, death during or soon after childbirth, have excluded many of the highest risk women from the NLS sampling frame.

Item nonresponse for our independent variables ranged from none to 20% for family income. In order to utilize all cases we employ multiple imputation by chained equations using Stata's *mi* commands (Rubin 1987; Royston 2005). To reduce bias in our estimates we multiply imputed data in person-record format to utilize auxiliary variables from multiple time points and include the Nelson–Aalen estimate of the cumulative hazard to survival time (White and Royston 2009; Young and Johnson 2015). Results presented are based on estimates from 20 imputed data sets (analysis using unimputed data were similar).

Dependent Variable

Death information comes from record linkages with the National Death Index and Social Security Death Index through March 2012 (See Appendix A for details on matching). Information necessary to link respondents to death records was collected in the first interview, making it possible to determine the age at death even for those respondents who attrite from the sample, regardless of when that attrition occurs. By 2012, the oldest surviving members of our sample were aged 90; the youngest were age 75. Because only some cohorts had reached the oldest ages, sensitivity tests restricted our mortality estimates to deaths that occurred on or before age 75. Results were similar when age of death is restricted; we present models that utilize all ages of death since cohort samples were drawn independently.

Independent Variables

Demographic characteristics.—We classify women within three 5-year birth cohorts: 1922–26; 1927–31; and 1932–37. The oldest cohort identifies women who were born before the Great Depression and aging into their 20s when the U.S. entered WWII. The youngest cohort members were born when the economy was at its worst, with the middle cohort born either just before or during the early years of the depression. Distinguishing these cohorts provides a proxy for ages of exposure to severe economic conditions. We estimate race differences by including a dichotomous variable coded 1 for blacks and 0 for whites; a small number of respondents who reported other races are excluded from this analysis.

Marital Biographies.—Among the full sample we include a dichotomous indicator of ever marry to denote those who are currently or were previously married. We include two measures of marital biographies for our ever married mother sample, age of first marriage and a summary measure of marital history. Age of first marriage uses three categories: those who marry younger than the modal age (before age 19), those who marry at the modal ages 19–24, and those who marry later than 24¹. We also classify the sample in terms of their

marital history. We use a series of questions asked across interview years about current marital status and changes in marital status since the last interview. Following previous research (Dupre 2016), our final categories are: continuously married; remarried; divorced/separated but not remarried; widowed and not remarried; and never married.

Childbearing Biographies.—Among the full sample, we include an indicator of motherhood and marital status at first birth. Childbearing biographies are summarized with three variables for the ever married mother sample—age at first birth, number of children, and marital status at first birth. Women designated as ‘mothers’ report having given birth to a live child. Age at first birth is also categorized relative to the modal ages. Early ages of first birth occur before age 19, modal ages are 19–24, and late first births occur after age 24. Parity is a continuous variable of the number of children ever born. Lastly, an indicator of having a child before marriage is included, which captures the sequence of these events.

Family Background.—In the initial wave, respondents answered a series of questions about their family circumstances at age 16. From these questions, we constructed variables to capture family structure and childhood SES. Respondents indicated whether they lived with both biological parents, a parent and a step-parent, mother or father only, or some other arrangement. Based on earlier sensitivity analysis, we define three categories: two-parent home, mother-only, and other, with two-parent home providing the reference category. We also included the occupation of the head of the household, dividing responses into white-collar, skilled, semi-skilled and unskilled, service, and farm occupations. We tested other characteristics such as mother’s education, father’s education, and mother’s employment status, but none warranted inclusion in the final models.

Midlife Characteristics.—We include measures of three dimensions of SES for our respondents—years of schooling (which we also tested as a series of categories); employment history of the respondent, distinguishing those who never worked outside the home, those who worked for pay fewer than 10 years, and those who worked for pay 10 or more years. Finally, we capture household income at first observation (having also tested averages across a series of surveys, ages, and quintiles). Family income is reported in thousands of 1967 U.S. dollars; \$1 in 1967 is equivalent to \$7.39 in 2017. We also control for health at first interview with a variable coded ‘1’ for respondents who report their health as fair or poor in 1967. Finally, we control for region of the country in 1967 by including a variable coded 1 for living in the south and 0 for all other regions.

Analytic Approach

We estimate Cox proportional hazards models (Cox 1972), which take the following form:

$$h(t|x_j) = h_0(t)\exp(x_j\beta_x),$$

¹Supplemental analysis tested alternate cut points, including race-specific cut-points in stratified analyses. Our cut points are similar to those used by Dupre (2007) though our modal category is 19–24 as opposed to 19–25. Other studies have used a continuous measure (Hughes and Waite 2009).

Where $h(t|\mathbf{x}_j)$ is the hazard rate (the rate of death) at age t for a woman with $\mathbf{x}_j$ characteristics. This model assumes that all hazard rates are proportional to a baseline hazard $h_0(t)$, which describes variation by age in the mortality rate when all independent variables are set to zero for a hypothetical person with mean/modal characteristics.

We estimate a series of models to test our hypotheses about whether and how family formation transitions affect age-specific mortality for a cohort of women initially interviewed when they were age 30 to 44. We test to ensure the effects of covariates are proportional and to identify race differences in how covariates influence mortality. Only the coefficient for widowhood in the marital history variable is non-proportional and in subsequent analysis we find the effect of widowhood weakens overtime; however, the results for other variables in the models are robust.

Results

Descriptive statistics

Table 1 reports descriptive statistics for the variables included in our analysis for each of our analytic samples (the full sample on the left, and the ever-married mothers sample on the right) by race, with significant differences by race indicated with an asterisk. The two columns on the left describe the entire sample of white (column 1) or black women (column 2); the two columns on the right describe the ever-married mothers for white (column 3) and black women (column 4). Looking first at the full sample, the two groups are equally spaced across the three sets of birth cohorts. Whites are slightly more likely to get married than black women and more likely to be consistently married. Considering their family backgrounds, only 60 percent of black women in the sample lived with both parents, while 82 percent of white women lived with both parents. Almost twice the proportion of blacks as whites lived with their mothers only, and blacks were twice as likely to have lived in households with some other structure. An indicator of childhood SES, the occupation of the head of household also differed by race, with black household heads much more likely than white household heads to be in farm or service jobs, and far less likely to be in white-collar or skilled jobs.

The right panel restricts the sample to ever-married mothers and expands the family formation variables to include estimates of the timing and sequencing of these events. The full sample and restricted sample are comparable across background and mid-life socioeconomic variables. Black women were more likely to marry outside the modal ages—both earlier or later compared to whites. Blacks who do marry are also less likely to be consistently married with higher proportions being widowed and divorced. Blacks are much more likely to have their first birth at younger ages, with about a third having their first birth before age 19 compared to only 11 percent of whites. In contrast, whites are more likely to have a late childbirth compared to blacks.

Mortality Models

Although a large majority of women in these cohorts engaged in both marriage and childbearing, we begin by comparing mortality rates for the childless and never married to

those who experienced marriage, childbirth, or both (Table 2). In these models, we focus on the key early adult events by including marriage and childbirth histories. Then we add two product interaction terms-- ever marry with race and motherhood with race-- to test race differences in the effects of these two dimensions of family formation. Finally, we add controls for early life family structure and mid-life characteristics.

In the first model of Table 2, results indicate that women in the more recent birth cohorts--those who were young children or born during the depression--have higher mortality rates. While being ever married is not associated with mortality, mortality rates are lower for mothers than the childless net of other characteristics ($HR=0.85$; $p<.05$). However, those for whom childbirth precedes marriage have significantly higher rates of mortality ($HR=1.29$; $p<.001$).

Next, we examine differences in how these family formation activities are associated with mortality by race. The results for Model 2 indicate that the mortality advantage of motherhood noted in Model 1 applies only to white women; the association of motherhood and mortality is significantly different for black women ($HR=1.40$; $p<.05$), whose rates of mortality are higher for mothers compared to childless women (Model 2). No race difference in being ever married is identified, thus we exclude the product term between ever marry and race from future models.

We find persistent racial differences in hazard rates for mortality by motherhood once we control for family structure, parental occupation, and midlife characteristics (Model 3). Higher levels of education, income, and employment that spans ten or more years are associated with lower hazard rates. Racial differences in the association of motherhood with mortality are illustrated in Figure 1, which presents the hazards of mortality by motherhood and race, adjusting for all covariates in Model 3. Childless white women (the dashed gray line) have the highest rates of mortality among all women in the sample, while white mothers (the solid gray line) have the lowest mortality. As noted, the association between mortality and motherhood is reversed for blacks. Childlessness may be associated with higher mortality because remaining childless was unusual and may have signaled an underlying health selection.

Ever-Married Mothers Mortality

Many of our hypotheses center on not only the occurrence of marriage and childbearing for later life mortality, but also their timing and sequencing. To examine the timing and sequencing of these events in detail, we now focus only on ever-married mothers. Limiting our sample to ever-married mothers reduces bias from health selection into marriage or motherhood that may also be associated with mortality. The model progression for these analyses begins with birth cohort, race, and family formation transitions, which include the timing and sequencing of first marriage and first child in addition to the subsequent marital history of these women. Interaction terms between race and the timing of first birth, timing of first marriage, sequencing of marriage and childbirth, and marital histories are included in the second model. We then use a more limited set of variables and interactions based on model fit criteria. Early life family structure and mid-life characteristics are then added in the last model.

Among ever-married mothers, black women have higher mortality rates, but the timing of the first marriage is not significantly related to mortality (Model 1). The age at first childbirth, however, does distinguish mortality rates and supports a health advantage for having children at relatively older ages. Women who had their first child later in life have significantly lower mortality rates than women who had their first child at modal ages (HR=0.84; $p<.05$). The number of children ever born is not associated with mortality rates for ever-married mothers.

We next include a series of interactions between family formation transitions and race to test for racial differences in the association between mortality and the timing, sequencing, and status of family formation transitions (Model 2). Among these interactions, only first birth timing is moderated by race. Black women who have a birth later than the modal age do not experience the same mortality advantage from delayed first births as white women.

Model 3 indicates that even controlling for confounding variables, racial differences in first birth timing persist. Further women raised on a farm, those who had longer work histories, higher family incomes, and women with more education had lower mortality rates. Finally, women who reported fair or poor health had higher mortality rates than those whose self-rated health was good or better.

Figure 2 uses estimates from model 3 to illustrate how the timing of first childbirth shaped mortality rates for white and black ever-married mothers. Aside from race and timing of first birth, all other variables are set at their means. The top three hazards curves illustrate the expected mortality rates for black women, with those who were older than 24 at first birth on top (the long dashed black line). Next are those who had their first birth earlier than age 19 (the dotted black line), followed by those who had first births at modal ages as the third line in the group (the solid black line). The bottom three curves describe mortality hazards for white women, illustrating the mortality advantage for having a first birth at older ages (the dashed gray line). Higher mortality rates characterize white women with first births at the modal ages (the solid gray line), and those who had their first birth when they were younger than modal ages represented by the gray dotted line. Mortality rates for this last group of white women clearly overlap with those of black women who had their first birth at modal ages. In other words, Figure 2 shows a significant racial disparity in mortality for women who delay their first birth past age 24. In contrast, among women having children at the modal ages (19–24), the racial disparity in mortality shrinks considerably. In sum, delaying childbirth is protective for white women, but associated with higher mortality for black women. However, looking within races, the difference in hazard rates associated with childbirth timing for black women is much smaller than the advantage found for white women who delay until after age 24.

Discussion

The life course perspective emphasizes the importance of social and historical context in interpreting the timing and sequencing of social transitions. For the most part, the women in our study had given birth and married before passage of the Civil Rights Act and before poverty and social welfare programs were enacted. For women born in our cohorts, life

course trajectories of health and income were significantly shaped by family transitions. Few women did not marry, and few were childless, regardless of race. But race most certainly defined both the social and economic worlds in which these women lived. Although they represent a different historical era, they are among the first cohorts for whom we have life course information combined with a sufficient passage of time to look at mortality outcomes.

In this study, we examine the lifetime association between the timing and sequencing of marriage and childbearing, two key events in family formation, with later life mortality. We test hypotheses derived from previous work, with particular attention to the cumulative disadvantage framework. A pathway of hardship began with a disadvantaged childhood and a transition to adulthood that held little potential for improved circumstances, then segued into lower SES in adulthood and higher rates of mortality. For whites, ‘on-time’ marriages followed by delayed births were on a pathway of relative advantage and associated with lower mortality rates. For blacks, however, the ‘weathering’ hypothesis suggests a different pathway, with delayed age at first birth associated with worse health and higher rates of mortality (Geronimus 1996).

In part, Geronimus’ argument pointed to race differences in lived experience as guides to behavior. While the 20s through early 30s were viewed as “prime” childbearing ages for white women, this life course pattern was different for black women. First births were more likely in the teenage years for black women, a difference that correlates with lower rates of infant mortality (Geronimus 1987). If these modal patterns are predictive of mothers’ long-term survival, then while a mortality advantage would accrue to white women who have their first child at older ages, for black women, the advantage would accrue to those who have their first child at younger ages.

Our findings support our second set of hypotheses in that we identify race differences in the association between age at first birth and mortality. Whereas delayed childbirth appears to carry a mortality advantage for white women, black women who delay having their first child are at a relative disadvantage. The ‘later’ versus ‘early’ or ‘on-time’ advantage for white women persists, even as we introduce a series of childhood and midlife characteristics. However, our first set of hypotheses are not supported; we find no evidence from these cohorts that the age of first marriage in itself is associated with mortality for white or black women. Nor do we find that being continuously married is associated with lower mortality, as previous research has suggested (Shor et al., 2012). Women with higher SES do have a mortality advantage, however, and continuously married couples average higher SES. For women in these cohorts, the marriage benefit may be economic, with the timing of first marriage reflecting no clear advantage. In contrast we find mixed results for our third set of hypotheses that sequencing matters; having a child before marriage is associated with an increased risk of mortality among all women, not only white women as we hypothesized.

This study is not without its limitations. Among these cohorts, premarital births were far less common among whites, and these data refer only to premarital births rather than both premarital births and pregnancies. One explanation is that once pregnant, white women were more likely to marry before the child was born (England et al. 2012). Data limitations

prevent us from identifying premarital conceptions that were followed by a “shot-gun” wedding. However, sensitivity analyses indicate that using a proxy for premarital pregnancies (those having a birth 6 or fewer months after marriage) produced no significant association with mortality. These results suggest a number of possible interpretations. Perhaps those who married prior to the birth were a socially select group. Alternatively, perhaps simply being married when the birth occurred is what mattered in that marriage provided both economic support and ‘legitimacy.’ Another limitation is our inability to capture biological and evolutionary links, which may be associated with both fertility and mortality. These genetic or evolutionary processes likely interact with social environments in complex ways, perhaps triggering either protective or exacerbating responses. Finally, since most of our sample is past peak childbearing ages at baseline, our sample excludes a majority of maternal mortality. Therefore, among those who do have children, only those strong enough to survive childbirth made it into the survey sample.

During the last quarter of the 20th century, when influential studies of teen pregnancy and single motherhood were conducted, many facets of pregnancy, childbirth, and single motherhood were different. Contraception, court decisions that changed abortion rights and eligibility for Aid to Families with Dependent Children, and medical improvements in prenatal care and delivery had changed the landscape. Much of the research on the timing and sequencing of childbirth and marriage has been complicated by social and political processes linked to urban and rural poverty, racial discrimination, and family structure (Quadagno 1994).

Overall, our results suggest that the disadvantage often associated with the timing of first birth may have extended across the life course to influence mortality. However, as the weathering hypothesis suggests, the birth timing associated with greater mortality risk in later life diverged for black and white women. Early childbearing may have been less detrimental to black women because of age-related differences in the sources of social support available in their communities, or because of racial differences in access to health care. Additionally, black women may have had less to gain by waiting, whereas white women who had earlier births may have been limiting their educational and economic growth potential. Black women had fewer options, so delaying childbirth may have provided no economic incentive to balance the greater physical toll of childbirth on the body. Any stigma associated with non-normative family formation may have been more closely linked to health for whites than for blacks for whom there was more variability around family formation.

Although the 15-year span of birth cohorts used in this study provides a relatively stable social context for norms of marriage and childbearing, our findings are specific to these cohorts. Research published in the 1970s and 1980s on teen pregnancy and unmarried mothers (Furstenberg, 1976 and Geronimus, 1987) studied the subsequent generation of women—the children of our cohorts of women. While in many regards the opportunities available to all women have expanded for more recent cohorts, many of these opportunities continue to be shaped by race. Black women, on average, continue to be raised in more disadvantaged circumstances, face racial discrimination as children and adults, and have more limited marriage markets. Given the current racial context, racial differences in the

association of family transitions with health and mortality may persist for current generations. Nonetheless, this study provides insight into how race differences in the social processes of family formation may shape life course health trajectories.

APPENDIX A - Supplemental Information on Mortality Matching Process and Quality

The mortality information on these respondents was collected in two waves. Beginning with the second interview through the final interview in 2003, interviewers recorded the life status of respondents who died between interviews when possible. In 2009, we initiated a first round of record linkages through the Demographic Survey Division (DSD) of the United States Census Bureau (USCB) and the National Center on Health Statistics (NCHS), which has a complete database of all death records provided directly by the state agencies and contains Social Security Numbers (SSN), first and last names, birth date, sex, and race. We followed the established protocol for the National Longitudinal Mortality Study that has a long history of mortality matching with the NCHS. The NCHS began collecting death certificates in 1979 and annually updates the database with new death certificate information. NDI uses an algorithm to match respondent information with death certificate data using 5 criteria to evaluate matches.

Results of the matching algorithm are classified into 5 classes: (1) exact match on SSN, first name, middle initial, last name, sex, state of birth, birth month, and birth year; (2) SSN matches on at least seven digits (one or more of the items from Class 1 may not match); (3) SSN unknown; eight or more of first name, middle initial, last name, birth day, birth month, birth year, sex, race, marital status, or state of birth match; (4) same as Class 3 but less than eight items match; (5) no NDI match.

Of the 4,988 members of the initial sample, 4,776 provided valid Social Security numbers; remaining cases had to be matched using the other criteria. Through this process we identified 840 new deaths and 1,990 deaths total. There were 653 (47% of the original 1,385 respondents) identified for African American and 1,337 (37% of the original 3,603 respondents) identified for white women. We then attempted to find the remaining cases in the Social Security Death Index, and we were able to identify 231 new deaths, 66 for African American and 165 for white women. In all but a few cases, these deaths had occurred between the end of 2008 and March 2012. All deaths reported in the survey were confirmed through the linked mortality files. Presumed survivors include 2,767 women (666 African American and 2101 white).

Table A1:

Mortality and Survivor Information by Race

	White (N=3603)	Black(N=1385)
<i>Proportion Alive</i>	58.3	48.1
<i>Number Alive</i>	2101	666
<i>Oldest Alive</i>	94	87

	White (N=3603)	Black(N=1385)
<i>Proportion Dead</i>	41.7	51.9
<i>Number Dead</i>	1502	719
<i>Mean Age of Death</i>	70	68

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Figure 1:
Age-Specific Smoothed Mortality Hazard by Motherhood and Race

Figure 2:
Age-Specific Smoothed Mortality Hazard by Timing of First Birth and Race

Table 1:

Descriptive Statistics Stratified by Race for Full and Restricted Samples

	Full Sample		Ever Married Mothers	
	White	Black	White	Black
Birth Cohort				
1922–1926	0.35	0.35	0.35	0.32
1927–1931	0.32	0.34	0.32	0.36
1932–1937	0.33	0.31	0.33	0.32
Family Formation Transition				
Ever Married	0.96	0.94*	1	1
<i>Age First Marriage</i>				
Early (ages <19)			0.21	0.29*
Modal (ages 19–24)			0.53	0.37*
Late (ages >24)			0.26	0.34*
Marital History				
Continuously Married	0.56	0.35*	0.53	0.37*
Remarried	0.06	0.04	0.07	0.04
Divorced	0.09	0.16*	0.1	0.17*
Widowed	0.25	0.39*	0.3	0.43*
Never Married	0.04	0.06*	0	0
Any Kids	0.92	0.89	1	1
<i>Age First Birth</i>				
Early (ages <19)			0.11	0.33*
Modal (ages 19–24)			0.48	0.39*
Late (ages >24)			0.41	0.28*
Parity	3.3	4.74*	3.3	4.81*
Child before Marriage			0.09	0.30*
Family Background				
Family structure				
Two Parent Home	0.82	0.60*	0.82	0.60*
Mother Only	0.10	0.18*	0.10	0.18*
Other	0.08	0.21*	0.08	0.22*
Parental Occupation				
White Collar	0.27	0.05*	0.26	0.05*
Skilled	0.17	0.05*	0.17	0.05*
Semi-Skilled	0.26	0.3*	0.27	0.31*
Farm	0.21	0.42*	0.22	0.42*
Service	0.08	0.18*	0.08	0.17*
Mid Life Follow Up				
Employment History				
Never Worked	0.19	0.15	0.16	0.14
Worked less 10 years	0.53	0.52	0.52	0.52

	Full Sample		Ever Married Mothers	
	White	Black	White	Black
Worked 10+ years	0.28	0.33	0.32	0.34
Family Income 1967 (thousands)	9.12	5.18*	9.23	5.25*
Years of Schooling	11.4	9.79*	11.35	9.71*
Fair/Poor Health	0.14	0.24*	0.14	0.23*
South	0.3	0.65*	0.3	0.66*
Dead	41.7	51.9*	40.5	51.5*
N	3603	1385	3203	1185

Note: Statistically significant differences at the $p < 0.05$ level by race denoted with *

Table 2:

Cox Proportional Hazards of Mortality Among All Women (N=4,988)

	Model 1		Model 2		Model 3	
	HR	95% CI	HR	95% CI	HR	95% CI
<i>Birth Cohort (Ref=1922–1926)</i>						
1927–1931	1.16 **	[1.05 1.29]	1.16 **	[1.04 1.29]	1.21 ***	[1.09 1.34]
1932–1937	1.36 ***	[1.21 1.53]	1.35 ***	[1.20 1.52]	1.42 ***	[1.26 1.61]
Black	1.29 ***	[1.18 1.42]	1.1	[0.74 1.66]	0.89	[0.68 1.17]
Family Formation Histories						
Ever Married	0.87	[0.70 1.08]	0.95	[0.71 1.28]	0.88	[0.71 1.10]
Mother	0.85 *	[0.72 0.99]	0.75 **	[0.62 0.91]	0.81 *	[0.68 0.96]
Childbirth before Marriage	1.29 ***	[1.14 1.45]	1.27 ***	[1.13 1.44]	1.25 ***	[1.11 1.42]
Parity	1.00	[0.98 1.02]	1.00	[0.98 1.02]	0.98 *	[0.96 1.00]
Ever Marry *Black			0.87	[0.56 1.34]		
Mother *Black			1.40 *	[1.04 1.89]	1.38 *	[1.04 1.83]
Family Background Characteristics						
<i>Family Structure (Ref=Two Parent Household)</i>						
Mother Only					0.95	[0.82 1.10]
Other					1.09	[0.96 1.23]
<i>Parental Occupation (Ref=White collar)</i>						
Skilled					0.98	[0.83 1.15]
Semi Skilled					1.07	[0.93 1.23]
Farm					0.84 *	[0.72 0.98]
Service					0.97	[0.80 1.18]
Mid Life Characteristics						
<i>Employment History (Ref=Never Worked)</i>						
Worked less 10 years					1.03	[0.92 1.14]
Worked 10+ years					0.70 ***	[0.61 0.80]
Income in 1967 (thousands)					0.98 **	[0.97 0.99]
Years of Schooling					0.97 ***	[0.95 0.98]
Fair/Poor Health 1967					1.13 *	[1.01 1.27]
South					1.07	[0.98 1.18]

Notes: HR=Hazard Ratios; CI=Confidence Intervals.

*
p<0.05**
p<0.01***
p<0.001]

Table 3:

Cox Proportional Hazards of Mortality Among Ever Married Mothers (N=4,388)

	Model 1		Model 2		Model 3	
	HR	95% CI	HR	95% CI	HR	95% CI
Birth Cohort (Ref=1922–1926)						
1927–1931	1.14 *	[1.01 1.27]	1.14 *	[1.02 1.28]	1.18 **	[1.05 1.33]
1932–1937	1.28 ***	[1.12 1.46]	1.29 ***	[1.13 1.47]	1.35 ***	[1.18 1.55]
Black	1.34 ***	[1.20 1.49]	1.24	[0.93 1.65]	1.09	[0.92 1.30]
Family Formation Histories						
<i>First Marriage Timing (Ref=Modal Ages 19–24)</i>						
Early 1st Marriage (<19)	1.00	[0.87 1.15]	1.07	[0.91 1.26]		
Late Age 1st Married(25+)	1.08	[0.95 1.24]	1.07	[0.90 1.27]		
<i>First Birth Timing (Ref=Modal Ages 19–24)</i>						
Early 1st Birth (<19)	1.15	[0.99 1.34]	1.18	[0.96 1.45]	1.09	[0.91 1.32]
Late Age 1st Birth(25+)	0.84 *	[0.73 0.96]	0.79 **	[0.67 0.94]	0.83 **	[0.73 0.94]
Childbirth before Marriage	1.15	[0.97 1.36]	1.27 *	[1.00 1.60]	1.24 **	[1.08 1.41]
Parity	0.99	[0.97 1.01]	0.98	[0.95 1.01]	0.98	[0.96 1.00]
Marital Status (Ref=Continuously Married)						
Remarried	0.83	[0.66 1.05]	0.81	[0.63 1.05]	0.83	[0.65 1.04]
Divorced/Sep	1.00	[0.86 1.16]	1.1	[0.91 1.33]	1.03	[0.88 1.20]
Widowed	0.77 ***	[0.69 0.86]	0.81 **	[0.71 0.93]	0.79 ***	[0.71 0.88]
Family Formation by Race						
Early 1st Marriage *Black			0.79	[0.59 1.08]		
Late 1st Marriage *Black			0.98	[0.74 1.29]		
Early 1st Birth *Black			1.03	[0.74 1.43]	1.01	[0.76 1.33]
Late 1st Birth *Black			1.32 *	[1.02 1.81]	1.35 *	[1.06 1.73]
Childbirth before Marriage *Black			0.84	[0.59 1.19]		
Remarried *Black			1.12	[0.63 1.97]		
Divorced *Black			0.78	[0.58 1.06]		
Widowed *Black			0.87	[0.69 1.10]		
Parity *Black			1.04	[1.00 1.08]		
Family Background Characteristics						
<i>Family Structure (Ref=Two Parent Household)</i>						
Mother Only					1.01	[0.86 1.17]
Other					1.11	[0.97 1.28]
Parental Occupation (Ref=White collar)						
Skilled					0.93	[0.79 1.11]
Semi-skilled					1.06	[0.92 1.23]
Farm					0.80 **	[0.68 0.93]

	Model 1	Model 2	Model 3
Service			0.96 [0.78 1.19]
Mid Life Characteristics			
Employment History (Ref=Never Worked)			
Worked < 10 years		1.02	[0.91 1.15]
Worked 10+ years		0.70 ***	[0.60 0.81]
Income in 1967 (thousands)		0.98 ***	[0.97 0.99]
Years of Schooling		0.97 **	[0.95 0.99]
Fair/Poor Health 1967		1.14 *	[1.01 1.29]
South		1.10	[0.99 1.21]

Notes: HR=Hazard Ratios; CI=Confidence Intervals.

*
p<.05

**
p<.01

p<.001