Supporting Information

Data Inputs

We draw on numerous data sources to obtain historical and projected demographic rates that we then translate into individual probabilities of demographic events. SI.1 (below) provides these sources.

Initial populations: We begin our simulations in 1880 from starting populations of 50,000 White and Black individuals drawn randomly without replacement from the 1880 United States Census (1). We select this sample size to maintain analytical tractability while using a large enough number of people that we avoid distortions in the marriage market and other problems that arise when simulating small groups; prior kinship microsimulation work has used similar sample sizes (e.g., 40,000 people in 2). Drawing from the Census allows us to initialize the model with populations that match the historical, race-specific population structures of the United States in terms of age and sex. The average age of the White population in 1880 is 24.7, while it is 21.3 for the Black population. Both groups show signs of recent growth, but the Black population has the hallmarks of growing more quickly, which is consistent with its higher fertility rates in the mid-19th Century (3). The Black population also has evidence of higher mortality, especially for men at middle and older ages.

Mortality data: We parameterize mortality by translating available and linearly interpolated data on life expectancies at birth into monthly race-age-sex-specific mortality probabilities with the updated Coale-Demeny Model West Life Tables (4). Historical life expectancy data by race for the period 1880 to 1949 do not disaggregate by sex (3), so we follow other estimates and symmetrically distribute life expectancy around them with a two year gap between White women and men and a one year gap between Black women and men (5). From

1950-2014 we use estimated race-age-sex-specific life expectancies (5), and from 2015-2060 we use projected race-sex-specific life expectancies from the most recent national projections of the United States Census Bureau (6).

Fertility data: We model fertility according to race-age-parity-marital status-specific rates. We develop these rates using three types of data: the total fertility rate (3, 7–9), marital status birth proportions (1), and age by parity status birth proportions for the United States (10). In our models, fertility can occur between ages 14 and 51. We model three parity levels: no prior births, one prior birth, and two or more prior births. We also focus on three marital statuses: never married, currently married, and widowed/divorced. We obtain age-parity-marital status-specific fertility rates for each race in three steps. First, we fit an ordinary least squares regression model to the United States data series in the Human Fertility Collection (MPIDR & VID 2016), which contains data on age-parity specific contributions to TFR that we standardized into their proportionate contribution to the total fertility rate. This model estimates the effects of age by parity by total fertility rate. This regression fit the data well, with predicted age by parity curves closely matching observed data; adding time period or data type controls added little additional explanatory power. Using model coefficients, we translate historical and projected total fertility rates into age by parity rates by multiplying them by the predicted proportions at that age and parity; in rare cases where the series had a negative minimum value, we added the minimum to ensure a positive function. We then adjust for marital status by dividing the proportion of births for each race that occur to single, widowed, and married mothers, which come from historical U.S. Census microdata (Ruggles et al. 2015) and our assumptions of the continuance of recent trends. A consequence of these procedures is that we assume that age by parity rates do not vary by race or marital status. From 1880-1900, we translate the total fertility rates into race-age-specific rates, ignoring parity and marital status, because the initial population lacks these features. From 1901-2060, after the simulated populations have developed parity and marital status, we use race-age-parity-marital status-specific rates dynamically adjusted for population exposure. These procedures allow us to model marital as well as non-marital childbearing for women of different parities.

Unmarried Parents, Non-Marital Partners, and Sex Ratios: When each birth occurs, Socsim records links between children and parents. If an unmarried woman gives birth, Socsim's "random father" parameter appoints an unmarried man over the age of 15 to be the child's father; Socsim users consider such individuals as cohabiting partners (11). We follow this practice in the main text and define partners as individuals who have a child together and have not married each other or anyone else since the child's birth. Then, the sex of the child is assigned randomly such that the proportion of births that are male fits a desired sex ratio at birth. We use empirical data on race-specific sex ratios at birth in the years 1970-2002 (12); from 1880-1970 we use the average values by race from 1970-1979, and from 2003-2060 we use the average values by race from 1993-2002.

First Marriage: We use sex- and race-specific historical data on marriage from 1880-2010 (13) to define age-sex-race-specific probabilities of nuptiality that we employ with Socsim's "two-queue" marriage market (11). We assume no men marry before age 16 and no women marry before 15. To create marriage rates, we use data on the mean age at marriage and the proportion married before age 45. We assume that approximately half of the population marries before the mean age at marriage, with exact proportions calibrated by race and sex to approximate observed mean age of marriage trends. Between the mean age of marriage until age 45, we estimate race-sex-specific marriage probabilities to fit the proportion of the population married by 45. After age 45, we set marriage rates for all race and sex groups to levels where unmarried individuals have a 5 in 1000 probability of seeking a partner each month; these low rates imply that approximately 30% of those unmarried at age 45 will attempt to marry by age 100, if they survive the duration.

Remarriage: For modeling remarriage, we assume that divorced and widowed individuals remarry at constant rates over time that differ by race and sex. We set monthly remarriage probabilities, regardless of age or period, such that given percentages of people will remarry in 20 years if they survive the duration. These remarriage percentages are based on historical estimates (14, 15) and calibrated to produce levels of 50+ year old spouseless individuals in accordance with estimates in SI.3. Specifically, we assume that White men are the most likely to remarry (72.5% over a survived 20 year interval), followed by White women (65%), then Black men (60%), then Black women (45%).

Divorce: Data on divorce by race come from multiple decrement life tables that provide divorce risk-per-year married (16) and historical crude divorce rates from 1880 to the present (17, 18). Socsim requires divorce risks to be input as risks-per-year married, which we obtain by adjusting the anniversary schedule of divorce by historical and projected trends in crude divorce rates. In the results that we presented, we assume that the United States crude divorce rate continues its recent trajectory of decline from the 2014 crude divorce rate (3.2 per thousand), but does so more slowly than it has of late such that it settles at 2.5 per thousand in 2060. We then linearly interpolate between the observed 2014 rates and the assumed 2060 rates. We examine sensitivity to different future divorce trajectories by considering how two alternative divorce scenarios affect our results below.

Partnership: In the main results, we included non-marital partners defined as those who have a child together and have not married each other or anyone else since the child's birth. This definition excludes childless partners. For contemporary estimates of kinless-ness, this omission is likely to have only a small effect because 92% of cohabiting (19) and 86% of dating (20) older adults have children. Accordingly, recent explorations of kinless-ness show that including or excluding different types of non-marital partners do not substantially alter prevalence estimates (21). We use two alternate partnership scenarios below to examine how robust our projections are to including different types of non-marital partnerships.

Aging and Population Size Scaling. In order to estimate the number of kinless individuals in the United States population, which is larger than the simulated population we examine, we multiply the simulated percentages ages 50 and above who are kinless in each race and sex group by Census estimates or projections of the population size ages 50 and above in those race and sex groups (1, 6). These procedures allow us to obtain estimates of the numbers of kinless individuals in each race and sex group and overall, by year. We also evaluated how well the simulated populations fit the age-structure of the population by benchmarking the Census estimates and projections of the population share ages 50-74 and ages 75 and above by race group to the simulated shares in those age groups, by race. In general, the simulated populations had comparable age structure to historical estimates and projections. For Whites, we found an average deviation of 0.5% across simulated years in the proportion of the population ages 50 to 74, an average deviation of 2.1% for the proportion ages 75 and above. For Blacks, we found average deviations of 0.9% for the proportion ages 50 to 74 and .08% for those ages 75 and above.

Two Divorce Scenarios

To test how future changes in divorce might change the trends or race and sex differences in kinless-ness, we evaluated the effects of two different future divorce scenarios. First, we estimate a model where contemporary divorce rates double by 2035 and then remain constant. Second, we estimate a model where divorce rates double by 2035 and then double again by 2060. SI.4 shows how the proportion kinless will change by race and sex under the baseline divorce scenario (from main results) and the two alternative divorce scenarios. Compared with baseline divorce scenario, the scenarios in which the divorce rate doubles or quadruples both increase the percentage without a spouse or children for all demographic groups. Although the baseline scenario has relatively flat curves for Whites, the doubling scenario implies an increase in the proportion with no living spouse or children for White men from 9.4% in 2015 to 12.1% in 2060, for White women from 8.7% to 10.0%, for Black men from 11.1% up to 15.2%, and for Black women from 11.5% up to 17.9%. The quadrupling scenario exacerbates this type of kinless-ness for all groups, bringing kinless-ness to 20.0% for Black women, followed by Black men at 16.9%, White men at 14.3% and White women at 11.7%. In each case, however, the race and sex differences and trends that we observe are consistent with those found in the baseline scenario. In all three divorce scenarios, Blacks see larger increases in kinless-ness than Whites, while the sex results differ by race so that Black women have larger increases in kinless-ness than Black men and White men have larger increases than White women. The bottom panels of SI.4 show that changes in future divorce trajectories have only limited effects on the proportion of the population with no living close kin (spouse/partner, children, siblings, or parents).

Two Partnership Scenarios

We next test how two different partnership scenarios affect our primary results. Because of small sample sizes available in empirical data, we make a number of simplifying assumptions in order to obtain current and projected rates of non-marital partnerships by race and sex. In *Partnership Scenario 1*, we include childless partnerships at levels consistent with the estimated contemporary prevalence and an assumed future trajectory of childless cohabitation, broken down by sex and race (19). These partnerships are added onto the set of partnerships among non-married parents considered in the main results. Extrapolating from cohort (19) and period (22) changes in cohabitation that show a nearly linear 0.3% increase per year for the last several decades, we assume that these rates grow linearly from 1998 to 2060 at that level, resulting in 18.6 percentage point increases for each race/sex group over the time span. *Partnership Scenario 2* uses a higher rate of childless partnership for each race and sex group drawn from analyses of older adult non-coresidential dating (20, 23). Consistent with empirical data, we assume 0.4% increases per year, resulting in 22 percentage point increases by 2060 in this scenario. SI.5 compares the results from the main analyses against these two partnership scenarios. Compared with the baseline partnership scenario, the scenarios with more childless partnership decrease the percentage without a partner and children for all demographic groups (top panels). The effects of including additional childless non-marital partners are larger for Blacks than for Whites. In these scenarios, the overall race and sex differences have the same pattern as in the main results. For Kinless2, the partnership scenarios make no difference in either the levels or the race or sex differences in kinless-ness. Even were all dating and cohabiting partnerships in older adulthood to be highly stable, they still would not erase the substantial growth we project in the share and size of the kinless population.

SI References

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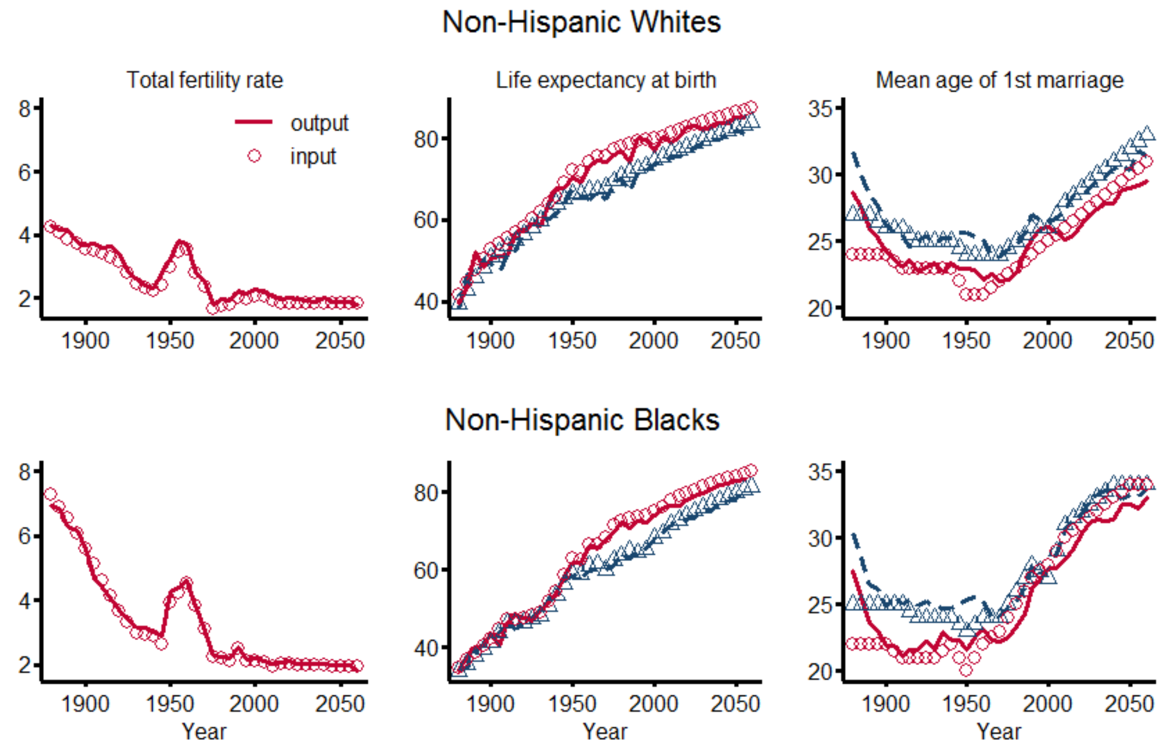
SI.1. Sources of demographic parameters for the simulation models.

Demographic parameter	Time period	Source
Initial Populations		
	1880	(1)
Life expectancy at birth		
	1880-1949	(3)
	1950-2014	(5)
	2015-2060	(6)
Total fertility rate		
	1880-1939	(3)
	1940-1979	(3, 8)
	1980-2013	(7)
	2014-2060	(9)
Proportion male at birth		
	1880-2060	(12)
Marital status birth proportions		
	1901-2060	(1)
Parity status birth proportions		
	1901-2060	(10)
Marriage rates		
	1880-2010	(13)
	2011-2060	Extrapolation
Remarriage rates		
	1880-2060	(14, 15)
Divorce rates		
	1880-1967	(16, 17)
	1968-2014	(16, 18)
	2015-2060	Extrapolation
Partnership rates	1880-1997	Non-marital childbearing
	1998-2005	(19, 20, 22, 24)
	2006-2060	Extrapolation and assumptions
Aging and population size scaling		
	1880-2060	(1, 6)

SI.2. Key rates, historical and projected changes over time and simulated outcomes, 1880-2060.

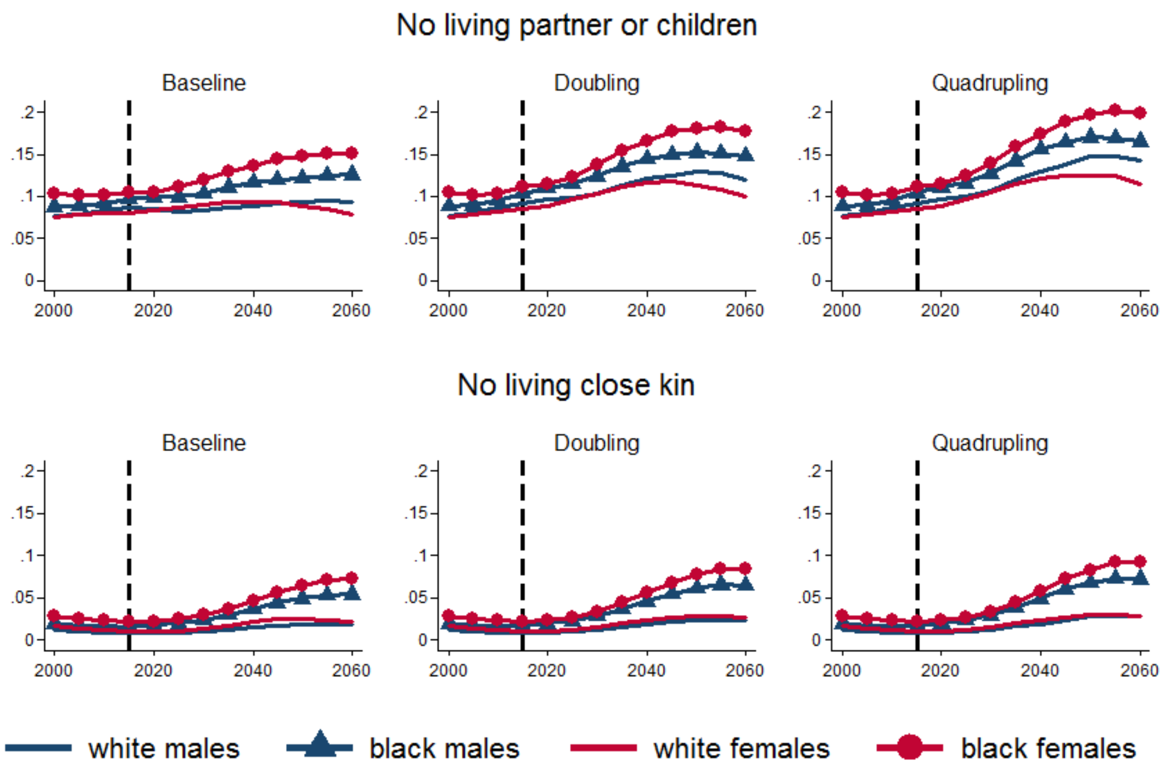


SI.3. Comparison of Simulation Estimates to Population Surveys.

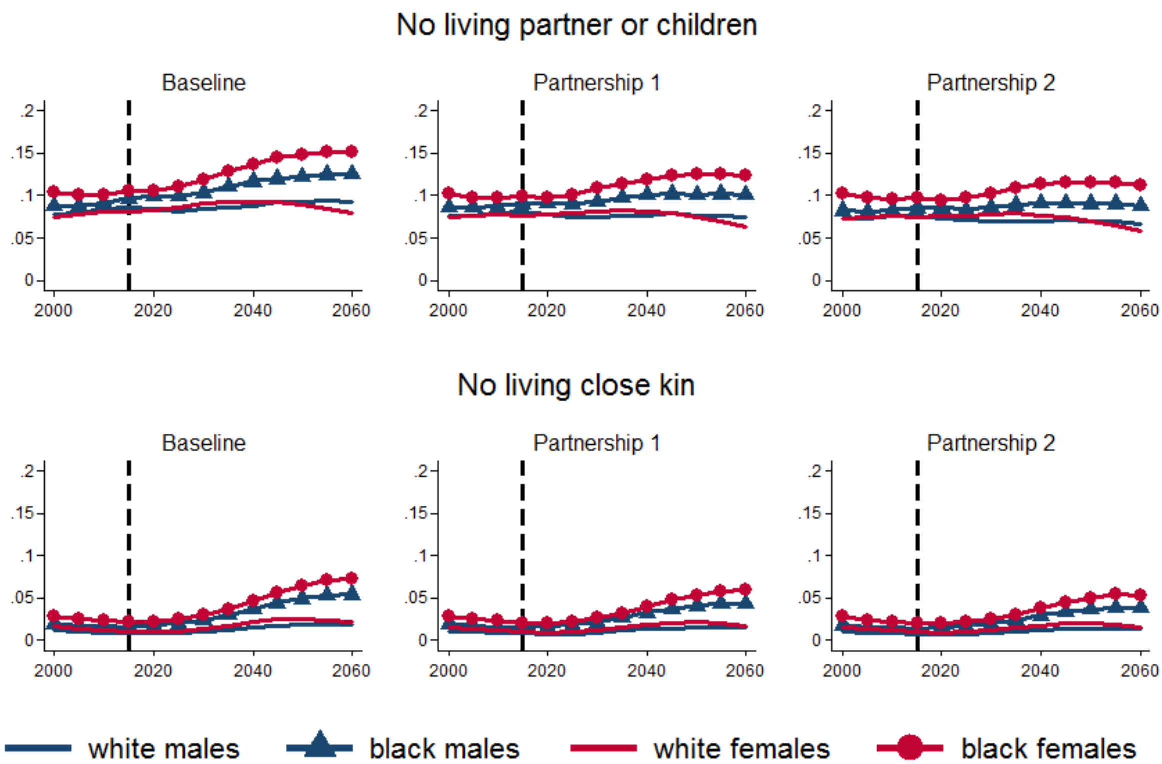
	Simulation (2010) Ages 50+ NH Whites	Simulation (2010) Ages 50+ NH Blacks	HRS (1998-2010) Ages 55+ All races	GSS (2010-14) Ages 50+ All races	NSFH (1992-94) Ages 50+ All races	ISSP (2001) Ages 50+ All races	PSID (2011) Ages 55+ NH Whites	PSID (2011) Ages 55+ NH Blacks
Percent without each kin type								
No biological children	19.2	18.0	10.5	13.8	9.1	17.0	18.0	26.0
No siblings	14.3	23.1	16.6	NA	14.5	14.4	NA	NA
No spouse	36.5	53.8	38.5	38.6	35.0	51.8	36.0	60.0
No biological parents	69.5	75.5	79.1	NA	73.3	65.4	61.0	77.0
Percent Lacking Kin Constellations								
No spouse or biological children	8.4	10.2	6.6	8.7	6.4	13.5	NA	NA
No spouse, children, parents, or siblings	1.1	2.1	1.1	NA	1.7	1.8	NA	NA

Notes: NA indicates estimate could not be calculated. Health and Retirement Study (HRS) 1998-2010 estimates come from Margolis and Verdery (2017) in *The Journals of Gerontology: Series B*. HRS estimates for siblings only include biological siblings. General Social Survey (GSS) estimates for biological children and no spouse or biological children are based on those who never had children. National Survey of Families and Households (NSFH) measure of siblings also includes half or step siblings. International Social Survey Programme (ISSP) data includes any siblings over 18 years old. Panel Study of Income Dynamics (PSID) estimates for NH Whites and Blacks are from Daw, Verdery & Margolis (2016) in *Population and Development Review*. Note that the estimates presented here focus on marital partnerships only; estimates for non-marital partnerships are available upon request.

SI.4. Proportion of older adults 50 and above with no living partner or biological children (Kinless 1: top panels) and no living close kin (Kinless 2: bottom panels) under three divorce rate scenarios, by race and sex.



SI.5. Proportion of older adults 50 and above with no living partner or biological children (Kinless 1: top panels) and no living close kin (Kinless 2: bottom panels) under three non-marital partnership scenarios, by race and sex.



SI.6. Age standardized values under two definitions of kinless-ness.

	White		Black	
	Women	**Men**	**Women**	**Men**
Kinless 1				
2015 value	8.0%	8.6%	10.5%	9.7%
2060 value	7.9%	9.3%	15.1%	12.6%
2060 value with 2015 age structure	7.0%	9.5%	14.7%	12.8%
Kinless 2				
2015 value	1.1%	0.8%	2.2%	1.6%
2060 value	2.2%	1.8%	7.3%	5.5%
2060 value with 2015 age structure	1.4%	1.4%	5.7%	4.5%

SI.7. Stacked proportions of older adults 50 and above with no living partner, biological children, siblings, or parents (*kinless 2*) by different categories, race and sex. Note: A dashed vertical line indicates 2015; proportions in Group A in key years are presented as points. Group A are those whose parents and siblings died and who never married or had children; Group B are those whose parents and siblings died, are previously married, and never had children; Group C are those whose parents died and never had siblings, never married, and never had children; Group D are those whose parents died, never had siblings or children, and are previously married. Group E includes the remaining cases, where children died.