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Race and Family in 20th Century United States

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By

Pil Hong Chung

A dissertation submitted in partial satisfaction of the
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Committee in charge:
Professor Joshua Goldstein, Chair
Professor Jennifer Johnson-Hanks
Professor Daniel Schneider
Professor Christopher Muller

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Abstract

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This is a collection of three studies that, together, seek to characterize the strong structural factors that have shaped black and white American family life over the 20th Century. The first of these studies highlights the two main challenges to measuring long-term trends in family composition in the United States using existing data sources: the lack of information from earlier historical periods—what I call the *temporal boundary problem*—and the inability of official Census data to identify family members who do not co-reside—what I call the *household boundary problem*. In order to overcome these challenges, I motivate a microsimulation-based demographic estimation strategy that allows for detailed measurement of family composition, given observed rates of fertility and mortality.

The second study in this series uses this demographic estimation strategy to examine the distribution of kin over the course of life for select historical birth cohorts of black and white Americans over the 20th Century. In so doing, I characterize the distinct family life trajectories that have separated black and white Americans for most of our recent history: black Americans, compared to their white peers, are likely to have had fewer available kinship resources at most ages, leading to earlier orphanhood, lower lifetime probabilities of transitioning into most kinship relations, and shorter durations spent in them once there. Though these differences have diminished over time as the mortality and fertility rates of black and white Americans have converged, they have not disappeared entirely: I estimate that black minors born in the period 2000-2010 will experience 58% more deaths in the family by the time they reach adulthood compared to their white peers.

The final study examines the risk and prevalence of imprisonment within the full family networks of black and white Americans over the course of the "prison boom" (1985-1995). In brief, I estimate that the average black American born at the height of the prison boom experienced the imprisonment of a relative for the first time at age 7 and by age 65 will belong to a family in which more than 1 in 7 working-age relatives have ever been imprisoned. By contrast, the average white American who experiences the imprisonment of a relative will not do so until age 39 and by age 65 will belong to a family in which 1 in 20 working-age relatives have ever been imprisoned. Further simulation analyses suggest that future interventions to lower the national imprisonment rate have the potential to meaningfully reduce this race gap in family imprisonment for future generations of Americans.

In combination, these three studies represent the first extensive use of a demographic estimation strategy to characterize the consequences of the three largest structural drivers of family composition and dynamics among black and white Americans over the past century: changing patterns of fertility, mortality, and mass imprisonment. While black-white differences in family composition due to differences in fertility and mortality have been decreasing over time, the recent movement toward mass imprisonment has created a new source of divergence that is likely to be felt by affected families for generations to come. While certainly not as grave as death, the level of social stigma and exclusion that a prison record brings with it can become a kind of "social death" if affected family members are removed from the pool of potential family support. From this perspective, the race gap in kin availability has not changed much over the past century: black families still suffer much greater loss of members than white families. What *has* changed is the source of that loss. Those family members that death used to remove physically are now removed *socially* by the system of mass imprisonment.

This dissertation is dedicated to the memory of my father.
Dad, I did it.

Acknowledgements

The journey that took me from first inception of this dissertation project to its culmination has been a long one filled with both great challenges and genuine moments of joy. All along the way, I was fortunate enough to have had the support of many great mentors, friends, and family to see me through.

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To Juan Pedroza: thank you for showing me what a true scholar looks like—our lucky number will always be 7. To my demography cohort—Peter Hepburn, Alison Gemmill, and Zhou Yi: I am so very proud to count you among my lifelong friends. When times were tough, you guys were the gas in my engine. To my comrades in sociology—Andrew Jaeger, Esther Cho, Zawadi Ahidiana, Martin Eiermann, Alex Barnard, Sunmin Kim, Sujin Eom, Eric Giannella, Lindsay Bayham, Dani Carillo, and all the staunch members of SoCA: thank you for teaching me how to learn. To my band mates—Leslie Root, Monica Alexander, and Robert Pickett: I guess we all have to open the drawer at some point, eh? Love you guys.

Finally, I would like to thank my partner in life, Aziza Abduragimova, and my family—my mother Kyung, my sister Jeannie, and my brother Hanjoon—for being there for me through every moment of these past several years. I truly could not have done it without your love and blessings.

-Pil H. Chung

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Introduction.
Race and Family in 20th Century United States

The American family is an institution that has been in a perpetual state of transition. At the turn of the 20th century, the typical American woman married for the first and last time at age 22, had three or four children, and lived to the age of 67.[1] All of these factors lead to "horizontally" extended families with many living members within generations, but very few living members across them. Culturally, the family was understood to be an *instrumental* and *collective* institution that protected the interests of the family unit (above the interests of any one particular member) against uncertain demographic and economic conditions (Hareven 1977). This orientation toward collective (versus individual) survival manifested most clearly in the family's prioritization of the parent-child relational axis (Coontz 1992).

By the middle of the century, falling mortality and fertility rates led to more "vertically" extended family structures comprised of increasingly multi-generational networks of relatives. Folks spent many more years in marriage, parents spent smaller proportions of their lives raising their children, and many more of them survived to see their grandchildren. This reduction in the amount of time spent bearing and rearing children, and the concomitant increase in the time spent in marriage, elevated the importance of the spousal relationship within the family (Coontz 1992). This trend toward a more "companionate" style of marriage (Cherlin 2004) occurred in conjunction with an increasing sentimentalization of the parent-child relationship (Zelizer 1985). With post-war prosperity catalyzing home ownership like never before, these structural and symbolic transitions coalesced into the much-romanticized nuclear family household composed of a working husband, stay-at-home wife, and their kids. This signaled the high-point of what many would later claim to be the quintessential American family (e.g., see Popenoe 1993).

Today, higher frequency of divorce and re-marriage, more non-marital childbearing, more cohabitation, more voluntary childlessness, and more same-sex house-holding have resulted in a greater diversity of American family forms (Cherlin 2010). Far apart from

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[1] All marriage, fertility, and mortality statistics reported here and hereafter are drawn from tables generated by the CDC's National Center for Health Statistics' National Vital Statistics System (NVSS).

indicating some true breakdown in the institution of family,[2] the constantly re-invoked discussions surrounding the nature of its boundaries, functions, and meanings are perhaps the greatest testament to the enduring importance of family in the lives of its members. While the question of who exactly counts as kin remains highly contested,[3] the fact of kinship remains a central organizing principle in American social life. The family, however it may be defined at any particular historical moment, has remained an ever-important source of social connection, support, and strain for its members.

The Place of Race in the Study of the American Family

Although the broad patterns of family change in the United States are as described above, it is important to be mindful of important heterogeneities that have modified this general pattern. In particular, the experience of family in the United States has varied strongly by race. Historically, these differences have been invoked mainly (and regrettably) as part of the national discussion on the issue of black family "collapse."

I deliberately place quotation marks around the word "collapse" to emphasize the politically-charged nature of the debate. Indeed, as Stephanie Coontz writes, "in almost every decade, for 200 years, someone has 'discovered' that the black family is falling apart" (Coontz 1992, 235). Today, most scholars of the American family agree that the historical salience of this debate lies less in the perceived breakdown of the black family, and more in the pressing need of the dominant mainstream to explain and justify persistent race differences in material and social wellbeing. For example, in explaining the politicization of teenage pregnancy (one of the more common themes of black family collapse), Frank Furstenberg notes that "teenage childbearing came to stand for something that it is not: a primary explanation for why so many poor people, especially poor minorities, do not succeed in American society" (Furstenberg 2007, 5). Perhaps unsurprisingly then, social scientists early in the 20th Century began to look for the source of racial inequality first within the black community—in the homes and in the family lives of black folks.

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[2] As historian of the family Tamara Hareven notes, the American family has seemingly been in a state of perpetual crisis: "From the early settlers in Plymouth to modern reformers and social scientists, the fear of the breakdown of the family has haunted American society. Every generation seems to be witnessing difficulties and to be predicting the family's collapse." (Hareven 1977, 69).

[3] The scholarly question about who counts as kin dates back at least as far as the old anthropological debate between those who viewed kinship as a matter of descent (as in the British tradition of Radcliffe-Brown and Evans-Pritchard) versus those who viewed kinship as a matter of alliance (as in the French tradition of Levi-Strauss).

According to these scholars, the history of slavery and post-slavery oppression lead to the adoption of harmful family forms and practices within the African American community (e.g., see Frazier 1939). This stream of research ultimately culminated in the "culture of poverty" argument (Lewis 1969) that was later enshrined in Moynihan's now-infamous 1965 report, "The Negro Family: The Case for National Action" (1965), which argued that the roots of black impoverishment could be traced to a "tangle of pathology" that originated in black family life: high rates of divorce, non-marital childbearing, and female-headed households.

The structuralist reaction to the Moynihan Report came swiftly. The deterioration of the black family, according to them, did not cause black impoverishment; black impoverishment caused the deterioration of the black family (e.g., see Allen 1979; Wilson 1987). Specifically, black families were not somehow encouraging pathological behavior among their members; rather, seemingly pathological behaviors were the result of crushing material conditions that made "normal" family life nearly impossible to achieve. Under such constraints, deviations from the normative two-parent nuclear household could even be more adaptive than pathological (Stack 1974; Allen 1979). A new line of culturalist thinkers further bolstered this perspective by positing the beneficial role of traditional African family values within the black American community: close relationships with extended kin, high esteem for motherhood, and communal childrearing (Nobles 1974, 1978; Billingsley 1968).

The Decoupling of Families and Households

In all these historical debates surrounding the black family and its supposed "decline," few questioned the very evidentiary basis for that claim. For example, single-mother and extended-family households were frequently presented as "broken families," and in the process, the obvious possibility that co-residential behavior may not perfectly proxy family structure often went un-addressed. Yet we know that there is a clear distinction between households and families. According to Anthropologist Sylvia Yanagisako, the former has to do with "propinquity" (a matter of proximity) and the latter with "kinship" (a matter of relationship) (Yanagisako 1979). While certainly the two are intimately related, they nevertheless cast two different shadows—overlapping, but not perfectly aligned.

I contend that this conflation of households with families has led to a certain lack of conceptual clarity in the historical discourse surrounding the American family. This tendency has proven particularly pernicious for black Americans over the past century. For example, higher rates of single-mother house-holding within the black population was translated by neo-conservative pundits and policymakers beginning in the 1970s into the *problems* of "deadbeat dads" and "welfare queens." Subsequent policy initiatives, such as the Clinton-era welfare reform ("workfare") and the expansion of the carceral system worked to penalize families exhibiting these "problematic" behaviors.

It is worth noting that this tendency to conflate households with families was driven, in no small part, by the fact that the primary sources of historical data on family composition were vital registries and census surveys that tracked familial relationships only within parent-child pairs and households. These data, though certainly informative in many ways, did not (indeed, *could not*) directly describe what we might think of as the *network* structure of families: the full "web" of surviving family members within which individuals are embedded.

It is a unifying preoccupation of this dissertation project to promote exactly this type of network perspective on the American family; and in so doing, to offer a re-orienting alternative to the co-residential perspective that has dominated the discourse on American family life for so long. What is gained by adopting this more network-oriented perspective is the shifting of attention away from trends in house-holding behaviors to trends in the *availability* of family members. This move, in my view, helps us peer beyond politically-charged questions of non-normative (i.e. non-nuclear) household structures and focuses us instead on a set of questions that get us closer to the heart of the matter: family support. After all, family support was always the real issue lying at the center of the black family "pathology" debate. The single-mother family, for example, was labeled "pathological" *not* for the mere fact that a woman lived alone with her child, but because that woman's presence alone was seen as insufficient to provide her child with appropriate care.

But what if she lived across the street from her well-off parents?

What if her husband was absent because he was working abroad for a better paycheck to send to his family?

These hypothetical scenarios alert us to the fact that family support cannot simply be inferred, one to one, from household structure. We must also be able to account for the availability of non-resident kin. Addressing this gap in the study of the American family is the main contribution of my dissertation project.

An Overview of This Dissertation Project

The overarching goal of this dissertation project is to provide a "network" view of the American family and to use this view to evaluate the effects of three important structural mediators of kin availability—fertility, mortality, and incarceration—on black and white American families over the past century. To that end, I have structured this dissertation project as a set of studies that, in combination, provide an extensive investigation of each of these mediating factors.

In the first chapter, I deal with the methodological challenge of measuring black and white family networks over the past century. I note the difficulty of directly measuring these networks using existing survey data and ultimately propose an alternative strategy based in demographic microsimulation that enables the translation of known fertility and mortality rate schedules into their implied kinship probabilities. In the second chapter, I use this microsimulation strategy to estimate the lifetime availability of kin for different historic birth cohorts of black and white Americans. In the third chapter, I extend the demographic microsimulation strategy to estimate the risk and prevalence of imprisonment within black and white family networks over the course of the "prison boom." Finally, in the concluding section of this dissertation, I discuss the broader implications of these race-specific trends in kin availability and imprisonment as well as their role in perpetuating the black-white gap in potential family support.

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Chapter 1.
Measuring Family Composition by Race in the United States

In order to explore the changing structures of family life for black and white Americans over the past century, we must first be able to measure those family structures. Faced with this challenge, researchers have typically turned to two main sources of data: large national surveys that include questions about family relationships and U.S. Census data on familial households. In this chapter, I examine these data sources, assess their relative strengths, identify their major limitations, and describe a set of methods that allow me to overcome them.

National Social Surveys

Many large national surveys include questions about family relationships. For example, long-running survey projects such as the Health and Retirement Survey (HRS)[4], the National Longitudinal Surveys of Youth (NLSY79 and NLSY97)[5], and the Panel Study of Income Dynamics (PSID)[6] all include some basic demographic information about respondents' parents, children, siblings, and (sometimes) grandparents. This information, with careful adjustments for survey design and post-stratification, can allow for the calculation of a limited set of nationally-representative family composition estimates.

One impressive example of research that makes use of survey data in this way is a study by Debra Umberson and Colleagues (2017). Using information from the National Longitudinal Survey of Youth 1997 and the Health and Retirement Study, these authors calculate the cumulative risk of family member[7] deaths over ages for black and white Americans in two birth cohorts: those born between 1900-1965 and those born between 1980-1984. The following is a reproduction of the main table of findings from this study.

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[4] The HRS (Health and Retirement Study) is sponsored by the National Institute on Aging (grant number NIA U01AG009740) and is conducted by the University of Michigan.

[5] The NLSY79 survey is sponsored and directed by the U.S. Bureau of Labor Statistics and conducted by the Center for Human Resource Research at The Ohio State University. Interviews are conducted by the National Opinion Research Center at the University of Chicago. The NLSY97 survey is sponsored and directed by the U.S. Bureau of Labor Statistics and conducted by the National Opinion Research Center at the University of Chicago, with assistance from the Center for Human Resource Research at The Ohio State University.

[6] The Panel Study of Income Dynamics (PSID) is produced and distributed by the Survey Research Center, Institute for Social Research, University of Michigan, Ann Arbor, MI.

[7] "Family" here includes parents, spouse, siblings, and children.

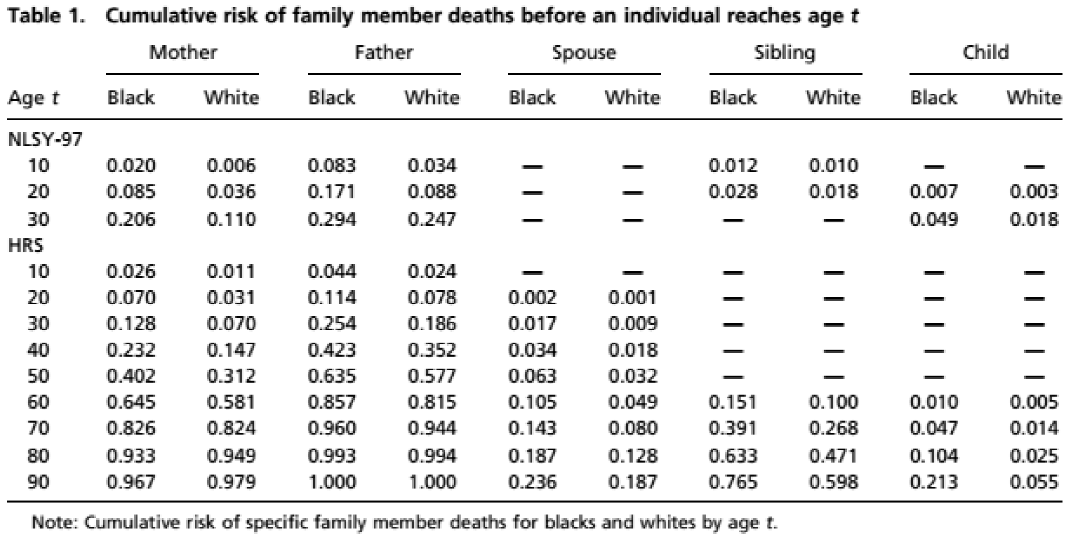

Table 1. Cumulative risk of family member deaths before an individual reaches age *t*

	Mother		Father		Spouse		Sibling		Child	
Age *t*	Black	White	Black	White	Black	White	Black	White	Black	White
NLSY-97										
10	0.020	0.006	0.083	0.034	—	—	0.012	0.010	—	—
20	0.085	0.036	0.171	0.088	—	—	0.028	0.018	0.007	0.003
30	0.206	0.110	0.294	0.247	—	—	—	—	0.049	0.018
HRS										
10	0.026	0.011	0.044	0.024	—	—	—	—	—	—
20	0.070	0.031	0.114	0.078	0.002	0.001	—	—	—	—
30	0.128	0.070	0.254	0.186	0.017	0.009	—	—	—	—
40	0.232	0.147	0.423	0.352	0.034	0.018	—	—	—	—
50	0.402	0.312	0.635	0.577	0.063	0.032	—	—	—	—
60	0.645	0.581	0.857	0.815	0.105	0.049	0.151	0.100	0.010	0.005
70	0.826	0.824	0.960	0.944	0.143	0.080	0.391	0.268	0.047	0.014
80	0.933	0.949	0.993	0.994	0.187	0.128	0.633	0.471	0.104	0.025
90	0.967	0.979	1.000	1.000	0.236	0.187	0.765	0.598	0.213	0.055

Note: Cumulative risk of specific family member deaths for blacks and whites by age *t*.

Figure 1. Table of results from Umberson et al. (2017) (p.916).

The *NLSY-97* cohort are those born between 1900-1965 and the *HRS* cohort are those born between 1980-1984. To summarize the major patterns: across all family relations, black individuals have a significantly higher estimated cumulative risk of observing a death in the family than their similarly-aged white peers. As the authors note, these estimates signal the possibility of strong racial disparities in life course exposure to all the material and emotional strains that deaths in the family can bring.

However, while largely plausible, these estimates suffer from two notable limitations that reduce their generalizability: (1) limited relational coverage; and (2) limited temporal coverage.

The first of these limitations have to do with the fact that the family questions in the NLSY-97 and the HRS do not probe the full range of kinship relations that may be present in respondents' family networks. For example, no questions exist in either survey about aunts or uncles. Even coverage of the nuclear kin relations that *are* observed in the data is imperfect: in the table above, information on spouse death, sibling death, and child death are missing for some age groups for both the NLSY-97 and HRS cohorts (Fig. 1).

The second, more critical, limitation of this estimation strategy has to do with the fact that the underlying survey data are only collected over relatively recent periods. The HRS was first administered in 1992 and the NLSY-97 was first administered in 1997. For earlier historical periods, these data cannot be used to derive reliable estimates of family composition by age—e.g. by re-constructing period data for earlier years by "aging backwards" older individuals in the study sample. This is because strong selection bias exists among those respondents from earlier birth cohorts: those individuals had to survive into the 1990s in order to be observed in these data at all. For example, one consequence of such selection may be that those who survive long enough to be included in one of our large national surveys are more likely to be from healthier (i.e. long-lived) families, and so estimates of mean kin survival drawn from this sample may systematically over-estimate the true value in the full birth cohort. For this and other selection-related concerns, the subset of older individuals that we observe in the types of survey data we have been discussing cannot be taken as representative of their birth cohorts in earlier periods.

The first of the limitations here discussed—*limited relational coverage*—may be overlooked if one is willing to simply restrict the scope of one's inquiry to a small subset of all possible familial relations (for instance, most surveys will include some information about parents and children). However, the second limitation—*limited temporal coverage*—poses a much more serious barrier to research if the goals of that research rely on estimates of family composition for a wide range of ages and over wide stretches of historical time. Up to now, I have discussed these limitations in the context of the study by Umberson et al. (2017), but it should be noted that these limitations apply to *all* studies that employ the most commonly utilized social survey datasets.

The Temporal Boundary Problem

The following timeline illustrates the periods over which a selection of major national social surveys (that include questions about family members) have collected data.[8]

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[8] Though each time range is represented here (for illustrative purposes) as a solid bar, data collection took place over non-uniform intervals across the different surveys.

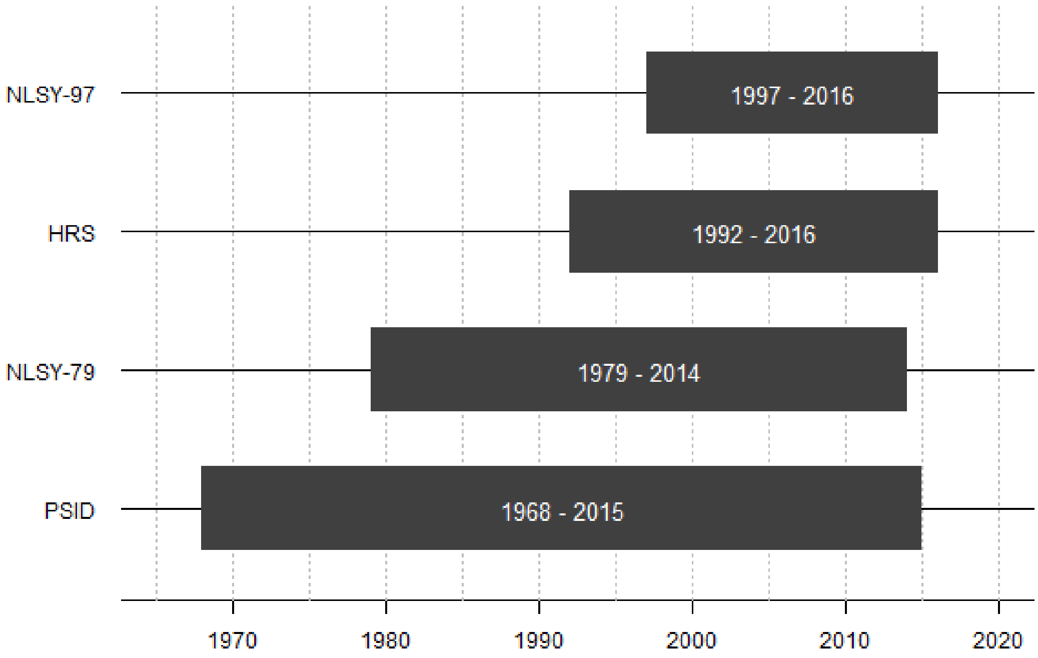

Figure 2. Timeline of survey data collection for select social surveys.

Most notably, the PSID—the longest-running household survey in the United States—administered its first wave of surveys in 1968. Looking at the oldest person in the earliest waves of the PSID (92-years-old in 1968) and the youngest person in the most recent wave of the NLSY97 (32-years-old in 2016), we might optimistically say that, combined, this set of surveys affords us data on people in birth cohorts as early as the 1870s and as late as the 1980s. However, as pointed out in the previous section, respondents cannot necessarily be considered representative members of their birth cohorts in periods that fall outside of the surveys' data collection periods.

To give a more complete picture of the extent of temporal coverage afforded by these large national surveys, I calculate the density of respondents in each wave of these surveys by age and period. Because, ultimately, I am interested in conducting comparisons across race, I further stratify my calculations by race category (i.e. black versus white Americans).

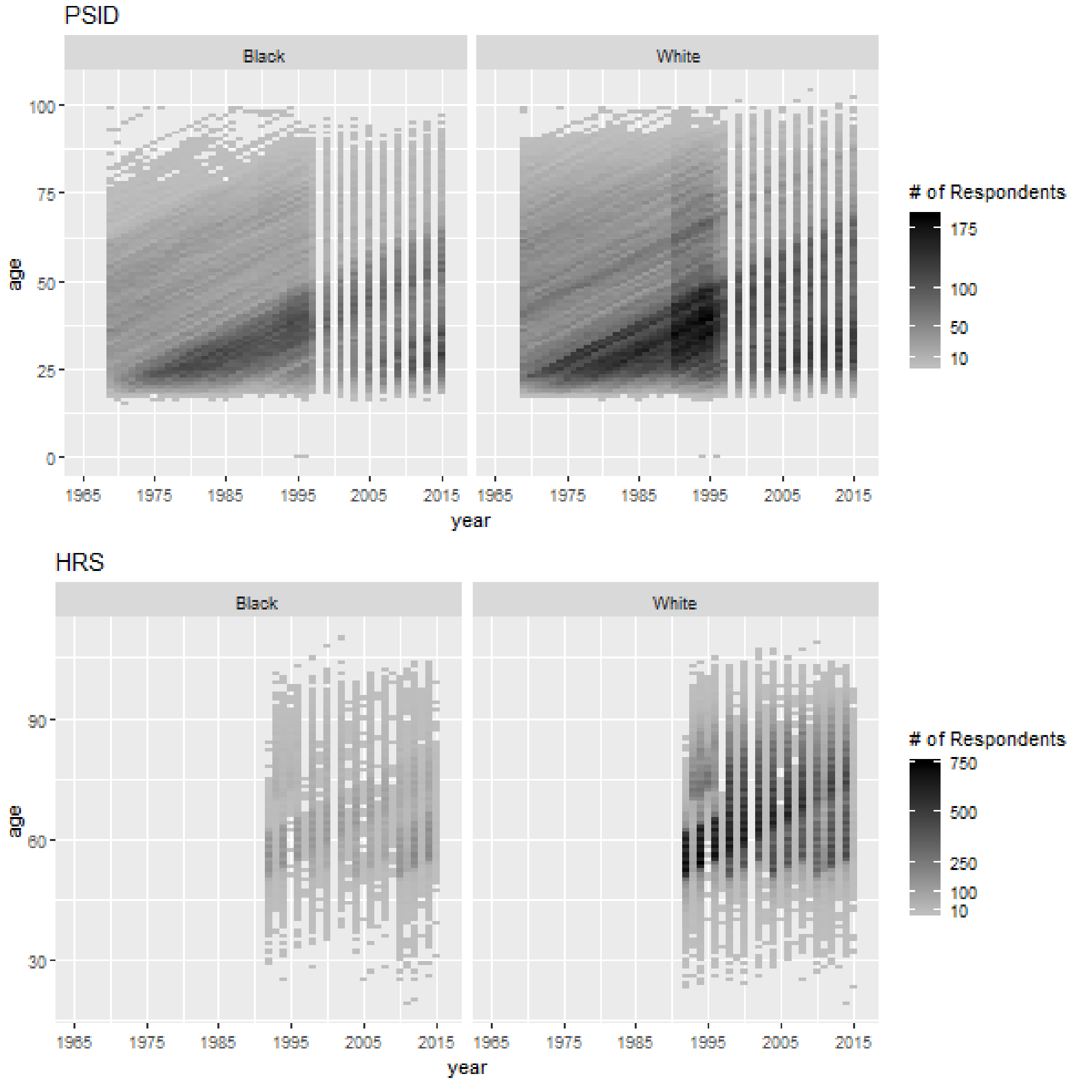

Figure 3a. Lexis surface of data availability for PSID and HRS (stratified by race of respondent).

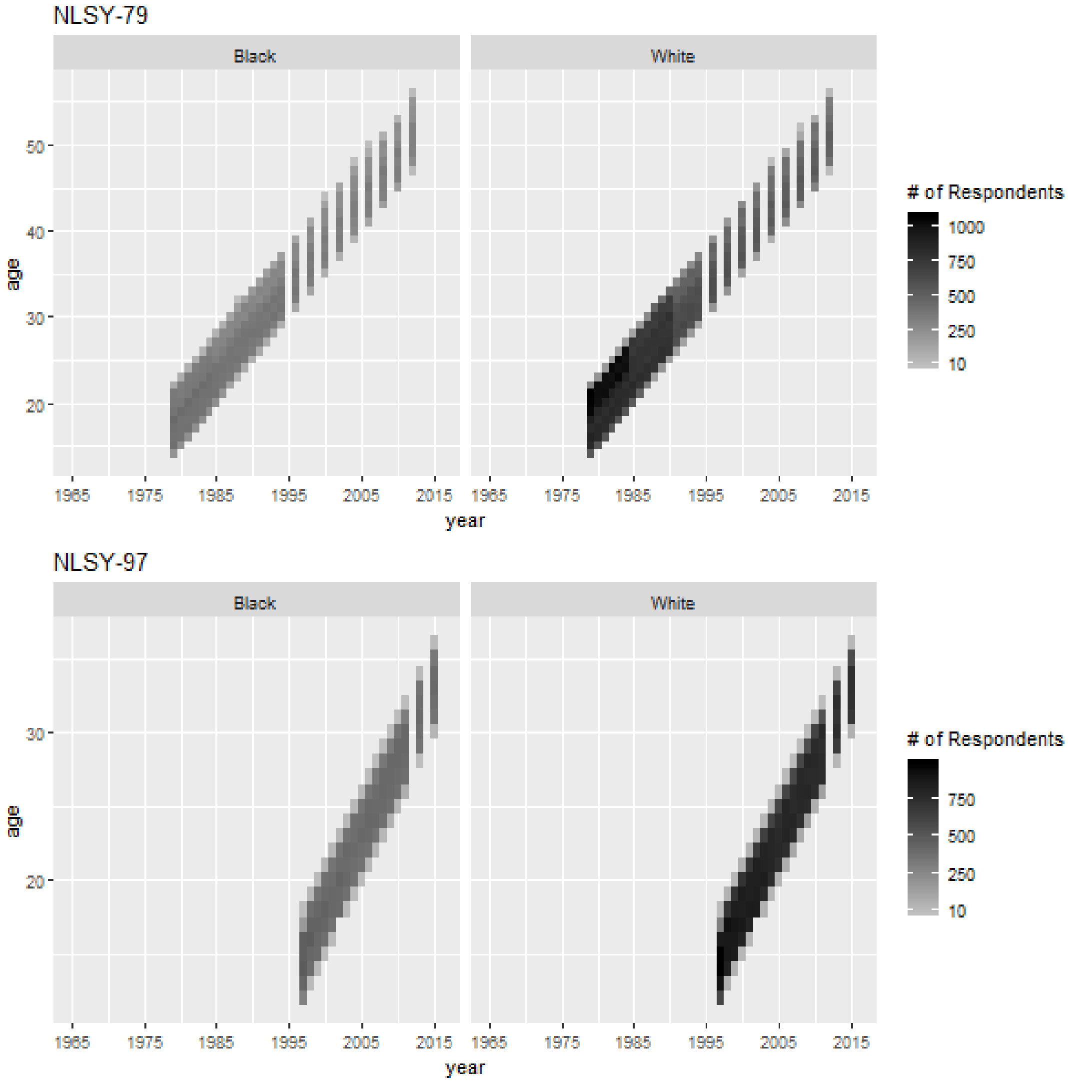

Figure 3b. Lexis surface of data availability for NLSY-79 and NLSY-97 (stratified by race of respondent).

As the Lexis surfaces in figures 3a and 3b illustrate, each of our selected surveys has certain age-period "sweet spots" where the bulk of their respondent data lie. For example, the HRS has a high volume of data for respondents aged 50 to 70 throughout most of their study period (1992 to 2016). Outside of these sweet spots, however, the data quickly become sparse. Taking the HRS, again, as an example, we see that there are very few (<10) records for the vast majority of age-year cells outside of the previously highlighted "sweet spot." In addition, stratifying these data by race of respondent further reduces the temporal coverage of these surveys, such that estimates calculated for black Americans are likely to be subject to greater uncertainty due to greater data sparsity and missing-ness than estimates calculated for white Americans.

More generally, the main limitation that figures 3a and 3b illustrate is the clear left-truncation in these survey datasets. That is, none of these surveys include any observations on their respondents in any years prior to the first wave of data collection. While this is largely a tautological statement, it nevertheless highlights the point: we cannot use these data to draw reliable inference on individuals or their families for earlier historical periods. This remains true even if we were to pool data across all available major surveys. If we agree that the PSID is the longest-running social survey in the United States from which we can derive reasonably good estimates of family composition, we are left with a situation where the earliest we can start our analyses is in the year 1968.

It is this inability to reliably estimate family composition for individuals who fall outside of these survey data “sweet spots” and collection periods that I call the *temporal boundary problem.* Any research (including this dissertation project) that seeks to characterize the family composition of Americans over a wide range of ages and historical periods, must first find a way to overcome this problem.

Census Familial Households

The second common source of data that is used for the estimation of family composition in the United States is the U.S. Census Bureau’s decennial and annual surveys of households. These data are, by design, nationally-representative in scope; and crucially, they overcome the *temporal boundary problem* discussed in the previous section: some version of the Census household survey has been administered in the United States since 1790. Given these clear advantages, the question begs itself: “Why not just use these data to estimate American family composition directly?”

In fact, several studies have attempted to do just that (e.g., see Bloome 2014; Cancian and Haskins 2014; Brower and Ruggles 2003; Ruggles 1994b). Perhaps the most comprehensive study of this kind, which also draws comparisons between race groups, is a report by Ruggles (1994a) that characterizes the familial household composition of black and white Americans over the period 1880 to 1980 using household roster data to categorize families as “fragmentary” (un-partnered individuals and single parents), “married couple” (childless couples and couples with children), or “extended” (including any non-parent, non-child kin) (Fig. 4).

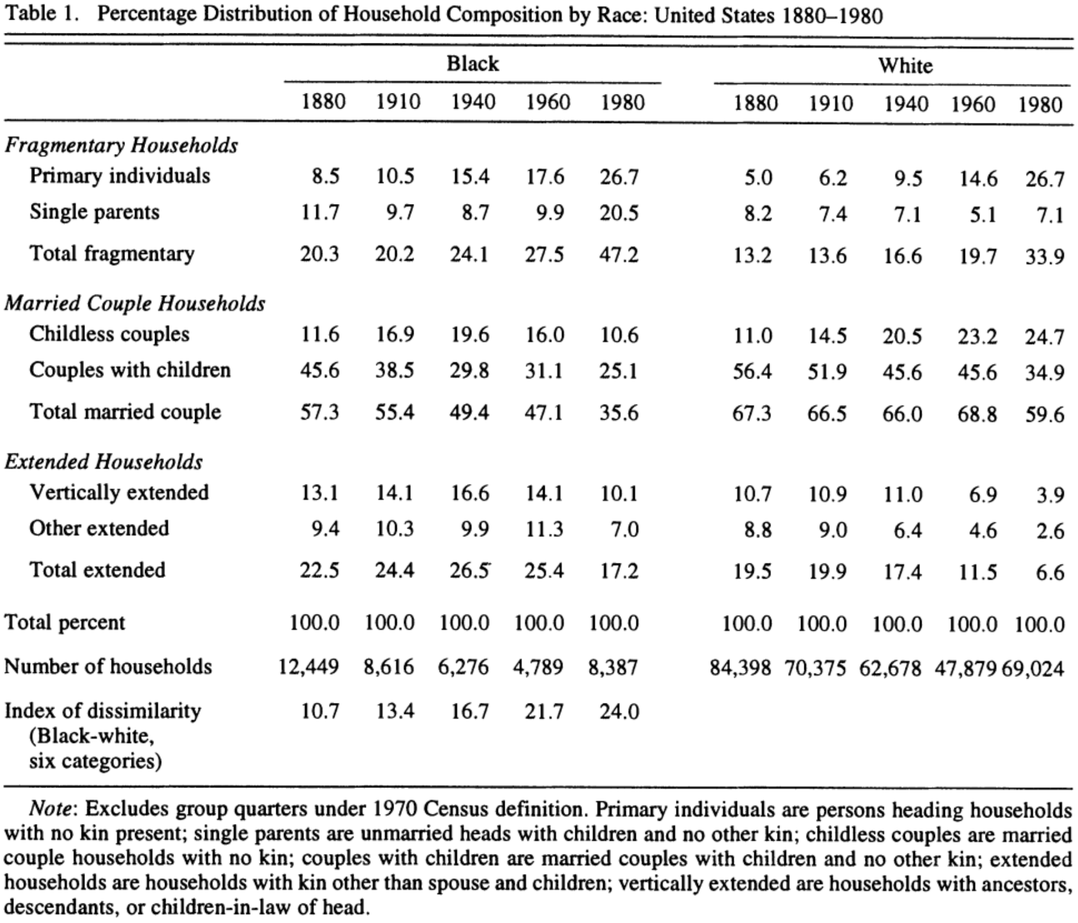

Table 1. Percentage Distribution of Household Composition by Race: United States 1880–1980

	Black					White				
	1880	1910	1940	1960	1980	1880	1910	1940	1960	1980
Fragmentary Households										
Primary individuals	8.5	10.5	15.4	17.6	26.7	5.0	6.2	9.5	14.6	26.7
Single parents	11.7	9.7	8.7	9.9	20.5	8.2	7.4	7.1	5.1	7.1
Total fragmentary	20.3	20.2	24.1	27.5	47.2	13.2	13.6	16.6	19.7	33.9
Married Couple Households										
Childless couples	11.6	16.9	19.6	16.0	10.6	11.0	14.5	20.5	23.2	24.7
Couples with children	45.6	38.5	29.8	31.1	25.1	56.4	51.9	45.6	45.6	34.9
Total married couple	57.3	55.4	49.4	47.1	35.6	67.3	66.5	66.0	68.8	59.6
Extended Households										
Vertically extended	13.1	14.1	16.6	14.1	10.1	10.7	10.9	11.0	6.9	3.9
Other extended	9.4	10.3	9.9	11.3	7.0	8.8	9.0	6.4	4.6	2.6
Total extended	22.5	24.4	26.5	25.4	17.2	19.5	19.9	17.4	11.5	6.6
Total percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of households	12,449	8,616	6,276	4,789	8,387	84,398	70,375	62,678	47,879	69,024
Index of dissimilarity (Black-white, six categories)	10.7	13.4	16.7	21.7	24.0					

Note: Excludes group quarters under 1970 Census definition. Primary individuals are persons heading households with no kin present; single parents are unmarried heads with children and no other kin; childless couples are married couple households with no kin; couples with children are married couples with children and no other kin; extended households are households with kin other than spouse and children; vertically extended are households with ancestors, descendants, or children-in-law of head.

Figure 4. Table of results from Ruggles (1994a) (p.138).

Based on these measurements, Ruggles (1994a) concludes that since the start of the 20th Century, a higher proportion of black American families (relative to white American families) have been composed of single parents, un-married individuals, and extended relatives. Additionally, this racial divergence in family composition has accelerated since the 1960s. In sum, this study provides a well-executed summary of the major changes to the familial household compositions of black and white Americans over the past century.

That said, the interpretation of its findings is limited by one important consideration: the study relies on measurements of households *not* families. I do not mean to claim here that studies like these that use household data, therefore, are somehow fundamentally flawed, but rather that such studies are well-suited to explore questions about *familial* *households*, which are theoretically and analytically distinguishable from *families*.[9] To the extent that the true purpose an analysis is to examine *family* composition, we must be mindful of the measurement barriers imposed by the household boundary.

The Household Boundary Problem

According to its official subject definitions, the U.S. Census defines a "family" as "a householder and one or more other people *living in the same household* who are related to the householder by birth, marriage, or adoption"(U.S. Census Bureau 2017, emphasis mine).[10] In other words, the Census measures family relationships only within the confines of the same residence. Linkages to relatives who live outside those residential confines (e.g. grandparents, adult siblings, aunts, and uncles) are not recorded and thus unobservable in these household data (Fig. 5). This, I call the *household boundary problem*.

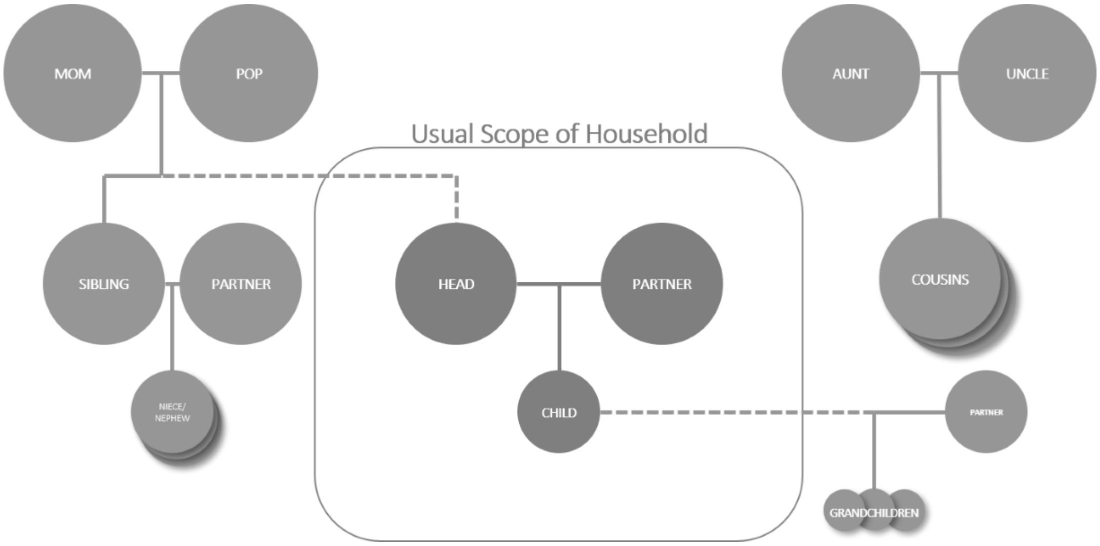

Figure 5. Conceptual diagram illustrating the "household boundary problem" as it may be realized in U.S. Census household data.

If we were to naively use these data to directly estimate full family compositions, we would end up with severely biased and truncated results due to strong systematic

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[9] Anthropologist Sylvia Yanagisako draws the distinction between "family" and "household" as the difference between "kinship" and "propinquity" (Yanagisako 1979).

[10] To the author's credit. this limited definition of "family" is noted explicitly in Ruggles (1994a).

selection factors that determine the types and numbers of kin that are likely to co-reside. For example, we might observe that the majority of Americans have only three to five members in their families and that they are nearly all either parents, siblings, or children. Almost entirely absent from this picture are the grandparents, aunts, uncles, and cousins who surely exist, but are rendered invisible by the household boundary problem. In addition, if we were to further stratify these estimates by race, we would introduce further complexity into the uncertainty of our estimates to the extent that the selection factors that determine which kin live together differ significantly by race (e.g. one race group might have a greater tendency for extended kin to co-reside).

A Solution: Demographic Estimation

Given all the concerns outlined above, we would ideally like to find a method to estimate American family composition that allows us to overcome both the *temporal boundary problem* and the *household boundary problem*. One ready solution lies in a class of demographic estimation techniques that allow one to deduce the compositional effects of known population rate schedules. The general idea behind these methods can be put simply like this: if we know something about the rate at which people transition between different conditions, we can arrive at some pretty good guesses of the relative distribution of people across those conditions.

In the case of family composition, we can use what we know about fertility and mortality rates to deduce the implied kinship probabilities. That is to say, if the boundaries of kinship are conditioned by genealogical relatedness, then examining the fertility and mortality trends of a population can help identify the likelihood of being in any particular kin relation at any given point in time for individuals within that population. For example, if parenthood is defined as the co-existence of a biologically-related child, then the likelihood of being a parent is adequately approximated by the age-specific rates at which individuals in the population reproduce and die.

Thus, demographically-demarcated kinship relations allow for an analytically tractable exploration of kin availability, and by extension, family composition. This insight has been a powerful driver of foundational research in the demography of the American family. For example, Uhlenberg (1980) used observed U.S. fertility and mortality rates in 1900, 1940, and 1978 together with assumptions regarding the average age of parents to predict shrinking probabilities of orphanhood, death of close family members, marital dissolution due to death, and longer durations spent in widowhood. Similarly, Watkins and Colleagues (1987) used a series of multi-state projection matrices in conjunction with observed U.S. fertility, mortality, and marital rates to estimate the proportions of individuals “surviving” in different familial relations over the period 1800 to 1980. This research demonstrated how, despite declining rates of childbearing and increasing rates of divorce, women born in the latter half of the 20th century spent more time as parents and in marriages than did women in previous generations (Watkins, Menken, and Bongaarts 1987).

Recently, improvements in computational power have allowed for more sophisticated simulation techniques that enable the modeling of demographic behaviors at the individual level. These techniques generate kinship projections at finer resolutions, and often with great fidelity to empirical fact (K W Wachter 1997). For instance, a study by Murphy (2011) used this type of microsimulation to characterize the transformation of kinship networks in England and Wales over the period 1850 to 2010. Using rates of fertility, mortality, and partnering derived from multiple historical sources, Murphy (2011) produced the first plausible estimates of kin availability in these regions over the course of their demographic transitions.[11] These estimates suggest that, over time, the mean number of older generation kin (e.g. grandparents) rose on average, while the mean number of kin of similar or younger generations (e.g. siblings and children) declined Murphy (2011).

In the following sections, I outline the two most fully-developed approaches to the demographic estimation of family composition: an analytic method formalized by Goodman, Keyfitz, and Pullum, and a simulation method developed by Wachter and Hammel.

The Analytic Method

The formal demography of kinship estimation has had a long history. Perhaps the earliest example is work published in 1931 by Alfred Lotka, which derived life table equations to estimate orphanhood rates from data on mortality and the mean age of childbearing (Lotka 1931). Subsequent work by Jean Fourastié, derived estimates of marital duration (joint survival time of husband and wife) from data on mortality rates (Fourastie 1959); and Heer and Smith used similar methods to estimate the likelihood of elderly parents having surviving children (Heer and Smith 1968).

Starting in the mid-1960s, a group of population researchers began in earnest to formalize the analytic framework for deriving counts of surviving kin. These efforts culminated in a set of life table equations by Goodman, Keyfitz, and Pullum (1974, 1975) that enabled the calculation of age-specific survival for a broad set of kin relations under

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[11] The "demographic transition" is the movement of a population from a regime characterized by high fertility and high mortality to one characterized by low fertility and low mortality (for extended discussions see: Caldwell (1976); Caldwell (2004)).

stable population conditions. These equations represented the strongest effort, at the time, to formally relate the structure of kinship to its demographic determinants; and they opened up exciting new possibilities for systematically exploring the relationship between fertility, mortality, and kinship wherever data on such quantities could be found.[12]

The Goodman Formulas

In Goodman, Keyfitz, and Pullum (1974), a method is laid out by which the expected number of living female relatives of different relations (e.g. mothers, daughters, etc.) is derived from age-specific rates of survival and fertility. For example, the number of surviving daughters to a woman of age a ($a > \alpha$) at time t is given by the formula:

$$\int_{\alpha}^{a} l_{a-x}\, m_x dx$$

Here, m_x is the number of female births to a woman of age x and l_{a-x} is the proportion of girls surviving to age $a - x$ (i.e. alive when mother is age a).

Applying the same logic recursively, a formula for the number of grand-daughters can be derived:

$$\int_{\alpha}^{a} \left[\int_{\alpha}^{a-x} l_y\, m_y l_{a-x-y} dy \right] m_x dx$$

Here, y indexes the daughter's age (i.e. the age of the mothers of the grand-daughters being counted).

Now moving *up* generations, the probability of mother's survival can also be written in terms of age-specific survival and fertility:

$$M_1(a) = \int_{\alpha}^{\beta} \frac{l_{x+a}}{l_x} W(x|t-a) dx$$

Here, $\frac{l_{x+a}}{l_x}$ is the mean probability that a mother who gave birth to a girl who is now age a (when the mother was age x) is still alive; and $W(x|t-a)$ is the age distribution (at time

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[12] For notable examples of work in this tradition see: Goldman (1978), Uhlenberg (1980), Hagestad (1986), Watkins, Menken, and Bongaarts (1987)

$t-a$) of women who gave birth to a daughter at time $t-a$. In their paper, the authors assume a stable population, such that:

$$W(x|t-a) = W(x) = l_x m_x e^{rx}$$

where r is the intrinsic population growth rate. Conveniently, the $M(a)$ function can be recursively re-written to characterize the probability of any older-generation maternal ancestor. For example, grandmother's survival is given by:

$$M_2(a) = \int_{\alpha}^{\beta} M_1\,(a+x) W(x|t-a)dx$$

In similar fashion, Goodman, Keyfitz, and Pullum (1974) also derives formulas for the age-specific counts of sisters, aunts, and female cousins. Thus, given only information about period survival and fertility by age, this analytic framework enables the estimation of expected counts for a very wide range of kin relations.

While certainly very powerful, this analytic method for estimating family composition also comes with a set of important limitations (Pullum 1987). First, this method assumes stable population rates (e.g. constant age-specific fertility and mortality). Thus, the l_x and m_x terms in the equations given above are not indexed by period. This can lead to highly implausible estimates, especially for kin relations that span over multiple generation. For instance, we know (historically speaking) that the fertility and mortality conditions faced by grandmothers are not likely to be very similar to those faced by their granddaughters.

A second limitation of this method is the lack of parity-specific fertility inputs. Without taking into account the parity distribution that lead to the overall observed age-specific fertility rates, these kinship formulas tend to predict a much wider spread of kinship sizes than is empirically observed. This is especially true in countries like the United States where parity-specific control via delay and contraception has become increasingly common over time.

Finally, Goodman and Colleagues' method is based on a one-sex model: all kinship relationships are traced through women only. In addition to the clear absence of male kin in the resulting kinship estimates, a one-sex model of kinship also risks mis-characterizing the overall size of families as well as the relative distribution of different kin types within those families. This is because there are notable differences in the survival and fertility probabilities of men versus women, which can influence family composition primarily (but not exhaustively) through the process of mate selection and marriage.

The Simulation Method

An alternative strategy for estimating the expected numbers of kin is demographic microsimulation. In recent years, the demographic microsimulator of choice for researchers seeking to estimate kinship using historical rate parameters has been SOCSIM[13], a well-validated microsimulation tool hosted and curated by the Department of Demography at the University of California, Berkeley[14]. Unless otherwise noted, all subsequent discussion regarding the demographic microsimulation method refers to its specific implementation in SOCSIM.

In brief, demographic microsimulation imposes a set of known fertility, mortality, and marital rate schedules on a simulated population of individuals. As the simulation progresses, month by month, these fictive individuals are born, find mates, reproduce, and die in accordance with the imposed rate schedules. The byproduct of this simulation procedure is a complete log of all the genealogical relationships between all individual members of the simulated population. This allows the researcher to directly re-construct, for a given set of demographic rate inputs, the implied kinship networks of any individual in the simulation at any point in that individual's life time.

In addition to a certain conceptual elegance, demographic microsimulation of this kind overcomes the main limitations of the analytic method discussed previously. First, the fertility and mortality rate inputs need not be held constant. As the simulation proceeds, year after year, these rates can be iteratively updated to reflect the empirically-observed period trends in fertility and mortality. Second, parity-specific fertility can be used as inputs thus allowing for more plausible distributions of kinship sizes. Third, microsimulations can be specified with demographic rate inputs for both males and females, so its kinship estimates are not constrained to a single-sex scenario.

To be fair, one can imagine implementing all sorts of extensions to the original analytic framework of Goodman, Keyfitz, and Pullum (1974) to overcome some or all of its limitations. However, at that point, the life table equations (as well as the data requirements) start to become so complex that one might as well do the microsimulation.

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[13] Some recent examples of high-quality work using SOCSIM are Verdery and Margolis (2017) and Murphy (2011).

[14] Additional information on SOCSIM may be found in Hammel and Wachter (1976), K W Wachter (1997), and online at http://lab.demog.berkeley.edu/socsim.

The Limitations of Demographic Estimates of Kinship

Demographic estimation of kinship, while affording a solution to the *temporal* and *household* boundary problems discussed earlier in this chapter, nevertheless come with its own set of limitations that should be noted and kept firmly in mind. These limitations can be sorted into two broad categories: "mechanical" and "semiotic."

Mechanical limitations refer to deficiencies in the specification of life table equations or in the programming of the simulation algorithm that lead to estimates that diverge significantly from observed truth. The most serious limitation of this kind is the inability of traditional analytic and microsimulation methods to account for within-family correlations of demographic behaviors, including the "inheritance" of fertility between mothers and daughters. This leads to unrealistic estimated distributions of kin per individual by reducing population-level heterogeneity in family size (Ruggles 1993).

Semiotic limitations refer to the inability of demographic estimation techniques to model individual behavioral patterns not accounted for in advance. Succinctly: estimated data are not "real" in the sense that they are not derived from measurements on real individuals. Therefore, such data are devoid of meaningful variation due to unaccounted for socio-cultural processes. Particularly for demographic microsimulation, idiosyncrasies in individual behavior observed within the simulation are deliberately introduced or just the product of stochastic processes determined entirely by the demographic rate inputs.

The mechanical limitations of demographic kinship estimation can be resolved by careful re-specification of life table equations (in the case of the analytic method) or programming (in the case of the simulation method). For example, the issue of intra-family fertility "inheritance" is resolved in SOCSIM by a set of tuning parameters that allow mothers' and daughters' fertility to be correlated.[15] However, the semiotic limitations are fundamentally insurmountable and must be acknowledged as a necessary limitation under which we conduct analyses and interpret results.

The Relative Advantage of Demographic Microsimulation

Though it is important to be mindful of the major limitations noted in the previous section, it remains the case that demographic kinship estimation is a logically appealing way to derive estimates of family composition that would otherwise be difficult or impossible to obtain directly from existing observational data. In particular, demographic

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[15] Following on the strategy employed by K W Wachter (1997), I set these inheritance factors in accordance with data presented in Pullum and Wolf (1991).

microsimulation provides the most powerful implementation of the demographic estimation strategy currently available. Compared to existing analytic methods, which only provide point estimates for quantities of interest assuming stable population rates, simulation methods can return the full distribution of those quantities allowing for historically-observed fluctuations in population rates.

To illustrate these points, I first plot the mean numbers of surviving female kin (i.e. grand-mothers, mothers, daughters, and grand-daughters) by age in 1940 and 1980 derived from: (a) the Goodman formulas specified with stable population rates; (b) a SOCSIM model specified with stable population rates; and (c) a SOCSIM model specified with historically-observed time-varying population rates (Fig. 6).

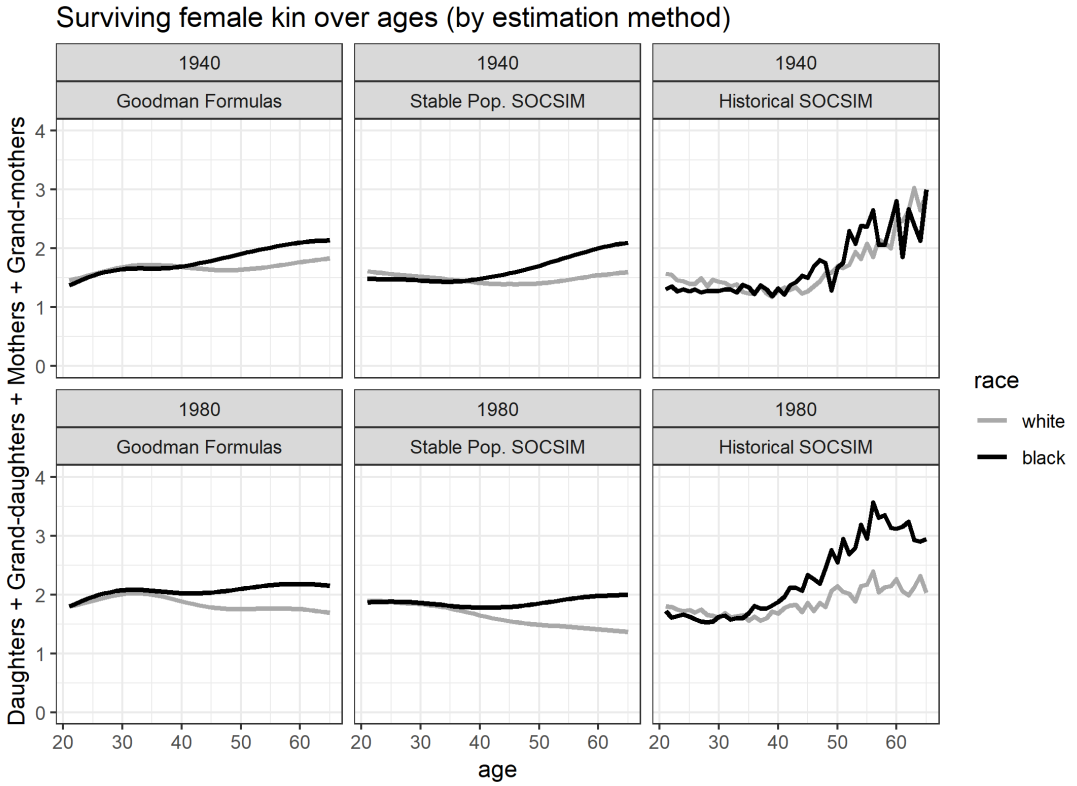

Figure 6. Estimates of the mean number of female kin in 1940 and 1980 by age. "Kin" here includes grandmothers, mothers, daughters, and granddaughters. The 'Goodman Formulas' and the 'Stable Pop. SOCSIM' are specified with identical period rate inputs. The 'Historical SOCSIM' is specified with rate inputs that have been allowed to vary year-to-year from 1900 to 2010.

When SOCSIM's rate inputs are specified to mirror the assumptions underlying the Goodman formulas—i.e., fixed period rates for fertility and mortality for the entire duration of the simulation—the age patterns in kin counts look very similar across the two estimation methods ('Goodman Formulas' versus 'Stable Pop. SOCSIM'). Even at the age of widest divergence, the stable population SOCSIM estimates do not deviate from the Goodman estimates by more than 0.16 kin. In other words, when specified to the same set of assumptions, SOCSIM (the microsimulation solution) produces results that appear not much different than those derived via the Goodman formulas (the analytic solution).

In addition, as mentioned earlier, SOCSIM comes with a few extra features: (a) it can give us the *distributions* of the numbers of surviving kin at each age rather than just the means; and (b) it can make use of historically-observed rate inputs to generate more plausible estimates of kinship sizes. To demonstrate what I mean by this, I plot the distribution of surviving female kin derived from the historical SOCSIM model for a selection of ages in a particular sample year, and draw dashed vertical lines indicating the point estimates (means) derived from the Goodman formulas (Fig. 7).

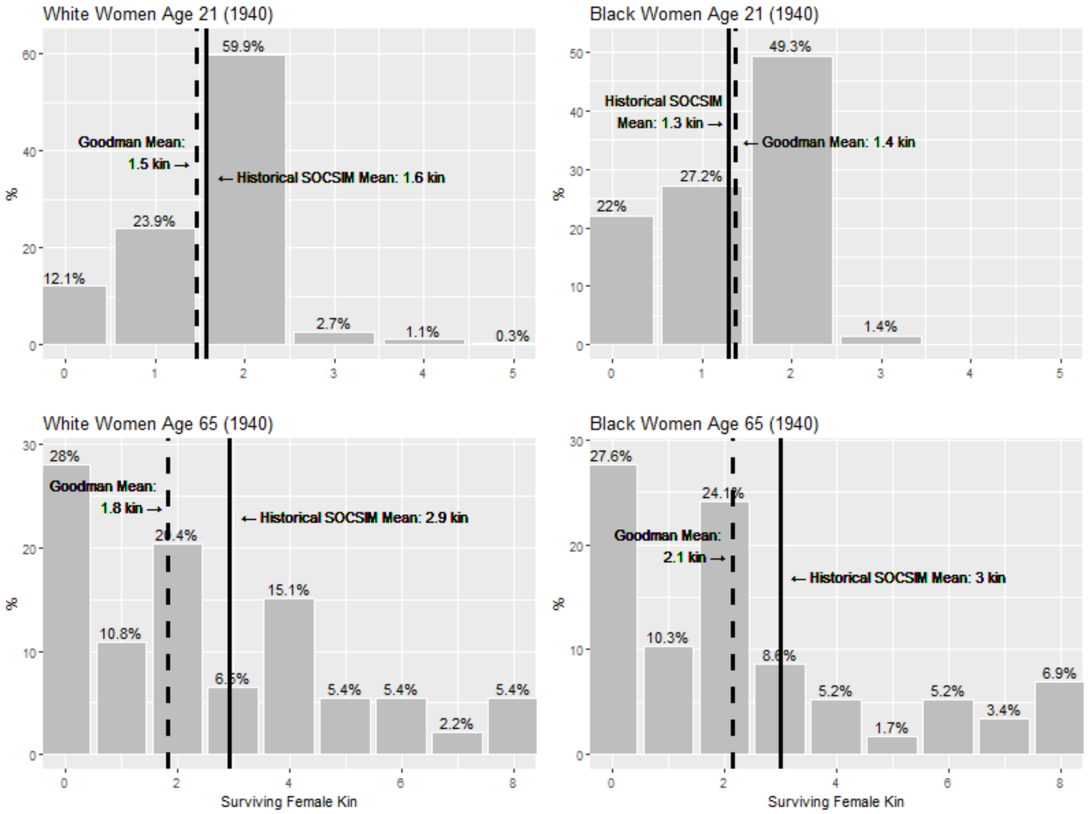

Figure 7. Estimates of black and white American kinship distributions for select ages in 1940. "Kin" here includes grandmothers, mothers, daughters, and granddaughters. The dashed vertical line indicates the point estimates for the mean numbers of surviving kin derived via the Goodman formulas, the solid vertical lines indicate the point estimates for the mean numbers of surviving kin derived via Historical SOCSIM, and the vertical bars represent the distributions of the numbers of surviving kin derived via Historical SOCSIM.

A few things are worth noting here. First, at earlier ages (e.g. 21) the mean counts of surviving female kin derived from the Goodman formulas and the historical SOCSIM models are very similar, while at later ages (e.g. 65), the Goodman means are notably dissimilar from the SOCSIM means. This aligns with our expectations given the mean age patterns of female kin survivorship, by estimation method, observed in figure 6. Second, the distribution of surviving female kin are neither uniform nor normal. This highlights the fact that the shapes of these distributions are not merely the result of random stochastic variation, but rather contain real information about the expected prevalence of individuals with varying numbers of surviving kin in the population. This is made possible by the fact that the historical SOCSIM model incorporates the cumulative effects of historically-varying (i.e. non-stable) demographic rate schedules and parity-specific fertility. The former allow the kin count distributions to reflect the demographic conditions of earlier periods and the latter allow the kin count distributions to reflect observed heterogeneity in family sizes due to parity-specific control of fertility behavior.

Thus, these distributions of surviving kin can reveal sociologically-interesting patterns that go beyond what just the means can tell us. In the present example (Fig. 7), for instance, we see that in 1940 a greater proportion of 21-year-old black women (22%) is estimated to have had no surviving female kin than among 21-year-old white women (12.1%). However, among 65-year-olds, this race difference does not exist: roughly 28% of *both* black and white women have no surviving female kin. This is explained by the fact that at earlier ages, white women have more surviving kin because their kin are subject to lower overall mortality rates; at later ages, the "advantage" in kin counts afforded by lower kin mortality among white women is counter-balanced by the "advantage" in kin counts afforded by higher fertility among black women's younger relatives.

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In sum, demographic estimation of kinship as implemented in the microsimulator SOCSIM can produce estimates that are very similar to those obtained from the analytic formulas of Goodman, Keyfitz, and Pullum (1974) when both are specified with the same rate inputs. In addition, SOCSIM is able to relax the stable population assumption and generate additional information about the *distributions* of kinship sizes rather than just the means. In principle, then, there should be no reason to use the analytic method over the microsimulation method if both methods are readily available. In practice, however, microsimulation methods can become so extremely data-intensive and computationally expensive—e.g., complex historical simulations can take days to properly calibrate and run—that sometimes the analytic method may prove "good enough" for many purposes.

In the end, it is up to the researcher to carefully weigh the gains and pains of each method, and select the one most suitable for the task at hand.

Conclusion

I began this chapter by posing a methodological challenge: how might we measure the changing structures of family life for black and white Americans over the past century?

To meet this challenge, I began by identifying two sources of data most commonly employed by researchers seeking to characterize the composition of American families: large social surveys (e.g. the PSID, HRS, and NLSY) and U.S. Census household surveys. With respect to the former, I demonstrated how large social surveys were limited by relatively recent data collection periods and sparseness in the age distribution of respondents even within those periods of observation. I discussed how these factors made it difficult or impossible to draw inference for earlier historical periods and even for some birth cohorts in more recent periods. This limitation I labeled *the temporal boundary problem*.

With respect to the latter—U.S. Census data on households—I noted how the absence of information regarding linkages to non-coresident kin prevented a full accounting of individuals' family networks. This limitation, I labeled *the household boundary problem*. Ignoring this problem and drawing inference naively from these data, I argued, would introduce strong systematic bias to estimates of total family composition that would, on net, tend to reduce estimated kinship sizes and heterogeneity in the distribution of kin types. To the extent that there exist strong racial variation in co-residential behavior, further uncertainty would be injected into any race comparisons that might be conducted using these estimates.

As a way to overcome both the *temporal* and *household* boundary problems, I proposed a pair of demographic estimation techniques—an analytic method (Goodman, Keyfitz, and Pullum 1974, 1975) and a simulation method (Hammel and Wachter 1976; K. W. Wachter, Blackwell, and Hammel 1997)—that could deduce the compositional features of family networks from observed fertility and mortality rate schedules. I highlighted the advantages and limitations of each, and conducted a formal demonstration of the unique advantages afforded by the demographic microsimulation technique as implemented in SOCSIM. In the end, I concluded that if data requirements are met and the computing resources are available, then demographic microsimulation is likely to provide the richest, most plausible estimates of kinship quantities obtainable from existing demographic rate data.

The remaining two chapters in this dissertation project, while less preoccupied by questions of data and methodology, nevertheless relied heavily on the considerations discussed here. In particular, I chose to use SOCSIM in both my analysis of family mortality (chapter 2) and family imprisonment (chapter 3). It is my hope that the reader, having accompanied me up to this point, will find that choice was founded on adequately firm ground.

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Chapter 2.

Kin Availability and Life Course Expectations in Black and White Families

The death of a family member is often a significant disruption in the lives of those experiencing the loss. This is especially true during childhood and adolescence, when close family members, parental figures in particular, serve as a primary source of emotional and material support (Umberson et al. 2017). The death of a loved one at these early ages likely presents affected youth with a set of existential challenges that may lead to altered life expectations and behaviors (Brown and Harris 1978; Finkelstein 1988; Wickrama et al. 2008). In such ways, early-life exposure to death in the family may trigger important changes in the emotional, material, and behavioral wellbeing of affected individuals.

To the extent that the likelihood of childhood exposure to death in the family is conditioned by significant race differences in patterns of fertility and mortality, we might think of differences in childhood exposure to death to be an important source and manifestation of ongoing racial inequalities in family life. This particular form of demographically-mediated racial difference operates along two dimensions: (a) differences in kin availability, and (b) differences in familial life course expectations. The former indicates inequalities in the support opportunities afforded by living kin, while the latter indicates inequalities in the distribution of kin death over the life course.

In this chapter, I use the term “kinship inequality” (or *kinequality* for short) to denote the combination of these two factors, which together produce qualitatively distinct developmental environments: at one extreme, childhoods characterized by late and infrequent exposure to death in the family and a consequent abundance of familial support opportunities; and at the other extreme, childhoods characterized by early and frequent exposure to death in the family and a subsequent dearth of familial support opportunities.

It is the goal of the present chapter to estimate and characterize the kinequality that existed between black and white populations in the United States at different moments in its history. Because no genealogical data exist for these national populations over the large span of time here considered, I rely on microsimulation techniques to generate complete kinship data calibrated to match the demographic behaviors observed in these populations over the period 1910 to 2009. Using these data, I estimate the race-specific probabilities of transition into and out of different kin relations at each age for birth cohorts that correspond to today’s youth, working-age adults, and seniors.

If we accept that the presence (or absence) of kinship relations meaningfully influence individual wellbeing, race differences in the availability and timing of those relations can have lasting implications for the relative wellbeing of different race groups (thus translating kinship differences into kinship inequalities). In the following sections, I explore some of these implications; and at the conclusion of this study, I re-articulate them as a form of genealogical constraint on the future life chances of black and white Americans that manifests as a "burden of adaptation" that must be dealt with (whether subsequently addressed or ignored) when death in the family occurs too frequently and too early on in life. Systematic black-white differences in this burden represents a form of racial inequality that, because of the large demographic and long temporal scales at which it operates, is likely to be both highly persistent and readily overlooked.

Background

Differences in demographic conditions are intimately connected to differences in the experience of family. That is to say, differences in when family members are born and die condition the trajectory of familial transitions (e.g. siblinghood, parenthood, orphanhood, etc.) that individuals are likely to experience over the course of their lives. Despite this basic relationship between demography and family life, not much research has been done to systematically translate trends in the former into trends in the latter. Instead, work on mortality and fertility differences today are often conducted in polite separation from work on differences in family composition and change. In the sections that follow, I review findings in each of these research domains, and then I offer the notion of "kinequality" as an analytic and conceptual bridge between them.

Black-White Differences in Mortality and Fertility

Differences in the mortality experiences of black and white populations in the United States have been well characterized. In general the cross-sectional pattern of life expectancy has been one of long-run convergence (Figure 1). However this convergence has been slow and imperfect; and race gaps in particular age-specific mortality rates persist (Arias 2014; Murphy, Xu, and Kochanek 2013; Sloan et al. 2010).

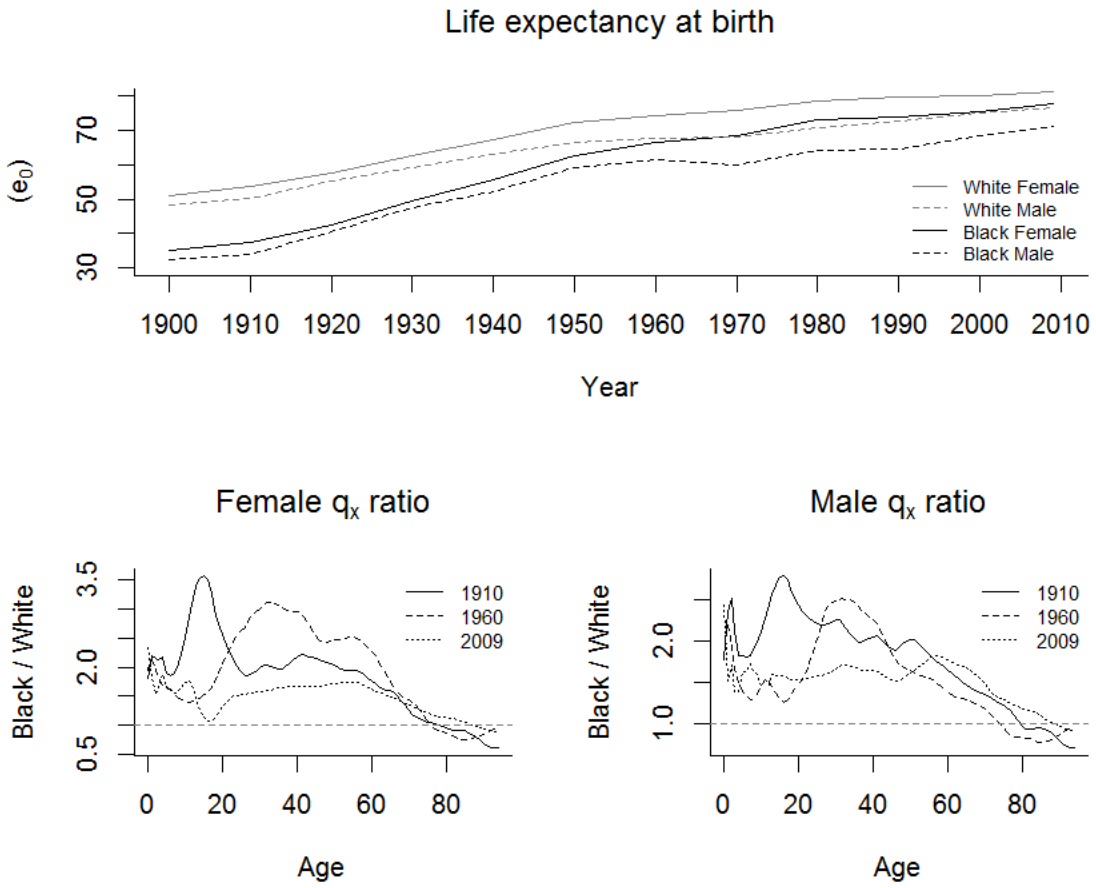

Figure 1. Black and white mortality. Top plot shows life expectancy at birth (e_0) over time by race and sex. Bottom plots show ratios (black/white) of death probabilities (q_x) for each sex at each age for select years (Data: NVSS Life Tables).

In particular, the infant mortality risk of black Americans continues to be markedly higher than that of white Americans (up to 2.5 times in 2000, and never lower than 1.4 times across all previous and subsequent years). At later ages the pattern flips (the so-called "mortality crossover") such that by age 90, surviving white Americans face higher risk of mortality than black Americans (Arias 2014; Johnson 2000; Lynch, Brown, and Harmsen 2003).[1] In fact, the patterns of age-specific mortality for black and white

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[1] More recent research (Masters 2012) suggests that the "mortality cross-over" might simply be an artifact of cohort-mixing within each period of observation. That is to say, within the same birth cohort, there may be NO crossover, but rather a continuation of the usual pattern of higher mortality risk for blacks relative to whites even at the oldest ages.

populations in the United States have never reached parity. Throughout the 20th century and well on into the first decade of the 21st, mortality risk at nearly every age has differed significantly by race.

Black-white differences in cross-sectional fertility patterns, on the other hand, have not been quite as dramatic. The total fertility rate (approximately: the average number of children per woman) of the black population has remained consistently higher than that of the white population (by about half a child) for most of the past century (Figure 2). This difference has diminished in recent years (Hamilton and Cosgrove 2010, 2012; Heuser 1976).

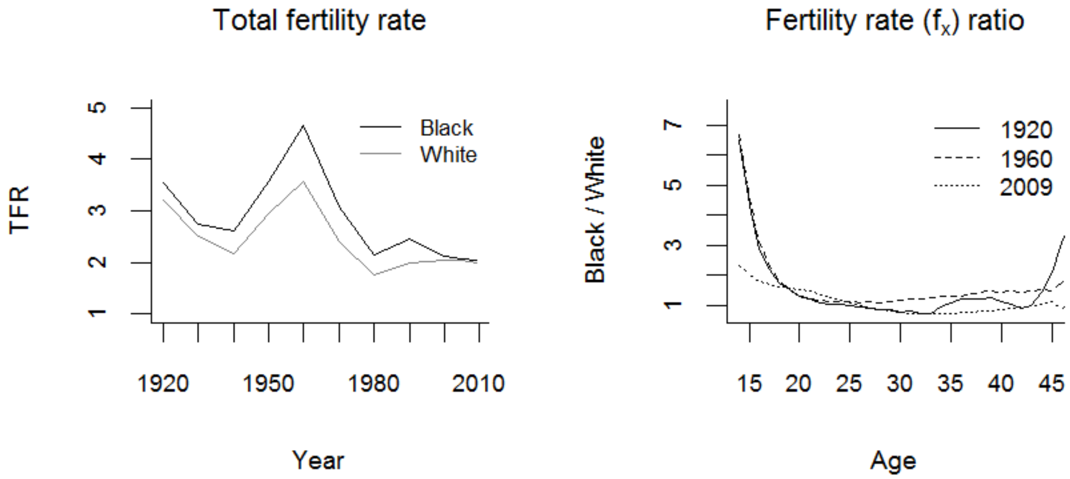

Figure 2. Black and white fertility. Left plot shows total fertility rate (TFR) over time by race. Right plot show ratios (black/white) of fertility probability (f_x) at each age for select years (Data: NCHS Central Fertility Rates).

Despite the recent convergence in total fertility rate, there remain marked race differences in the age-specific patterns of fertility observed in even the most recent periods. Notably, the rate of teenage child-bearing is higher for black Americans than that of white Americans (1.72 times on average for 14-18 year-olds in 2009, and nearly twice that in decades past). However, the rate of childbearing in the remaining reproductive ages is more similar between the black and white national populations (Figure 2).

The persistence of these trends has motivated much research highlighting inequalities in the mortality and fertility experiences of black and white Americans. However, this research has often remained narrow in scope, dealing with inequalities as manifest only at distinct moments within the life course. Studies often focus on discrete segments of the age-specific mortality and fertility profiles of blacks and whites, and on only those causal explanations that account for the majority of deaths and births in those particular age categories.

For example, studies examining the race gap in infant mortality typically restrict analyses to the earliest ages and frame discussions mainly in terms of complications due to low birth weight (e.g., Carmichael and Iyasu 1998; Iyasu and Tomashek 2002; Schempf et al. 2007; Schoendorf et al. 1992). Studies examining the race gap in adolescent and young adult mortality risk typically restrict analyses to ages below 24 and frame discussions mainly in terms of "external causes" (i.e. suicide, homicide, and accidents) (e.g., Mulye et al. 2009; Singh and Yu 1996). Studies examining the race gap in the remaining adult years typically frame discussions in terms of socio-economic resources, healthcare access, chronic disease, and frailty (e.g., Davey Smith et al. 1998; Hummer 1996; Johnson 2000; Macinko and Elo 2009; Rogers 1992; Sorlie et al. 1992).

Research on the race gap in black-white fertility, too, is often conducted separately for specific age categories. For example, fertility differences at younger ages are often considered within the context of pre-marital childbearing, focusing on causal factors embedded in the childhood developmental environment (e.g., Bumpass and McLanahan 1989; South and Baumer 2000). Fertility at later ages, meanwhile, is often considered within the context of marital fertility, and research focuses on causal factors related to adult mate availability, socio-economic situation, and fecundity (e.g., Jain 2006; Smith, Morgan, and Koropeckyj-Cox 1996; South and Lloyd 1992; Wellons et al. 2008).

What receives far less attention in the literature on black-white demographic differences is the ongoing impact of fertility and mortality events at one moment in the life course on subsequent life course moments; or more precisely: the impact of these race gaps on the life course trajectories of the surviving families and future generations. Thus, what is often missing from the literature on black-white mortality and fertility gaps is a "big picture" of race differences in familial co-existence over the life course and the concomitant implications for early or delayed transitions into different familial roles for black and white family members. For example, research has documented the scale and causes of race differences in infant mortality, but we have little sense of how this mortality difference translates into differences in (for instance) the experience of siblinghood and grandparenthood between black and white families.

At first glance, the historical convergence of overall mortality and fertility trends in the black and white national populations might seem to suggest that race differences in family networks will naturally fade over time. However, this is not at all certain. Though black and white life expectancies and total fertility rates have indeed been growing more similar over time, persistent race differences in the way that fertility and mortality events are distributed over age may lead to meaningfully divergent trajectories of family life course experience. For example, black women and white women may have the same number of children over the course of their lives, but consistently later childbirth by the latter group results in later transitions to motherhood and subsequently higher likelihoods of maternal orphanhood at earlier ages for their children (holding all else constant). In such ways, persistent race gaps in fertility and mortality at specific ages may not necessarily shift the overall levels of kinship, but they may very well change its distribution over a life time.

Thus, the demographic history of a family is not only reflected in the births and deaths of a single historical moment, but in the accumulation of several such moments embedded in the living memories of individuals and their kin, spanning over multiple generations. This complex interplay between the life trajectories of individuals and their kin makes characterizing the likely configuration of the family neither a simple nor predictable task. In this chapter, I introduce a methodological framework founded on a demographic understanding of kinship and an analytic strategy based in simulation that enables us to begin the delicate task of discovering family in the intricate web of individual life lines.

Black-White Differences in Family Composition

Several studies examine black and white American kinship networks in specific regions, at specific times, or for specific familial relations (e.g. Agresti 1978; Eggebeen and Uhlenberg 1985; Eggebeen 2002; Morgan et al. 1993). but there are few comprehensive examinations of black and white kinship networks at the national level and over wide stretches of historical time for a wide range of kinship relations. A notable exception is a study by Ruggles (1994) that uses data from the Integrated Public Use Microdata Series (IPUMS) to characterize the compositions of familial households of black and white Americans over the period 1880 to 1980. This study finds that single-parent families and extended families (i.e., families containing kin other than children and spouse) are more common among black American households than among white American households. This trend is found to be present throughout the period 1880-1980 with evidence that the race gap in familial household composition has in fact increased over that same period (Ruggles 1994).

The analysis presented in Ruggles (1994) marks the first time that historical census records have been fully leveraged to characterize compositional differences in nationally-representative samples of black and white American families over time. In some respects, this study provides the most comprehensive answer to the question of how black and white Americans are likely to have experienced family differently throughout most of U.S.

history: black individuals are more likely than their white peers to have had absent parents, absent spouses, and non-nuclear relatives in close physical proximity.

One important limitation of Ruggles (1994) is related to its reliance on household data. The assumed relationship between households and families is given in a footnote: "Following U.S. Census Bureau practice, the term family refers here to any group of related people who reside together" (p.139). In other words, family networks are captured only to the extent that their relational linkages fall within the boundaries of the household[2]. This leads to imperfect estimates of family configuration since the moment a family member leaves the household for any reason (e.g., to work abroad) they are lost to observation. Additionally, certain non-nuclear kin (e.g., adult siblings) are likely to be missed altogether since these individuals are frequently non-co-resident in many U.S. contexts. Finally, data derived from the U.S. census only allows for period-specific estimates; within-household changes in family configuration are not reliably tracked over time. A recent review of demographic research on the American family cites these and related factors as all contributing to the general pattern of weakening correspondence between family and household (Cherlin 2010).

The present study seeks to address these limitations by using microsimulation techniques (calibrated to U.S. National Vital Statistics inputs) to produce complete kinship data un-constrained by household boundaries, and measurable at any moment in time. In this way, this study is both an extension and an alternative approach to the research started by Ruggles (1994). Like Ruggles (1994), this work attempts to provide nationally-representative estimates of family configuration over wide stretches of time; but it conducts this investigation taking complete individual genealogical histories rather than familial households as its unit of analysis.

Kinship Inequality

So far, I have reviewed the literature on black-white differences in fertility and mortality, and black-white differences in family composition. At the conclusion of each review, I have noted limitations confronting each domain of research with respect to each's ability to shed light on black-white differences in the experience of family: On the one hand, research on inequalities of birth and death are poorly translated into inequalities in family composition; on the other hand, research on inequalities of family composition suffer poor generalizability due to absent or incomplete data.

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[2] I refer to this issue as the *household boundary problem* in the previous chapter.

In order to resolve these limitations, I propose the concept of “kinship inequality” or more succinctly *kinequality*, which may further serve as an analytic and conceptual bridge connecting demography and the study of family. Operationally, I define kinequality along two dimensions:

1. *Kin availability*: age-specific probabilities of transition into and out-of different kinship relations due to differences in age-specific rates of fertility and mortality of individuals and their related kin

2. *Familial life course expectations*: the expected sequence of these kinship transitions over the life span.

Conceptually, these two components of kinequality each suggest a category of mechanisms by which differences in the life time experience of kinship might be translated into inequalities in wellbeing: constraint on the opportunity for familial social support and potential disruption of normative life course expectations. I expand on each of these mechanisms in the following sections.

Kin Availability

One plausible mechanism by which race differences in kinship patterns may lead to meaningful differences in the life chances of black and white Americans is by differentially constraining the opportunity for social support. Understood as a bundle of instrumental and emotional resources (or deficits) made available by virtue of some set of relational ties, social support (or its lack) has been posited as an important source of advantage and disadvantage for individuals at all moments within the life course (Umberson, Crosnoe, and Reczek 2010). A substantial literature on the “transition to adulthood” describes the many ways in which the navigation of relational and institutional ties in pre-adult years are critical to future wellbeing (Hogan and Astone 1986; Shanahan 2000).

The family, as a primary site for early-life support and socialization, takes a central location within this framework (Steinberg and Morris 2001). To the extent that racial subpopulations differ with respect to their family structures during their pre-adult years, differences in the timing and quality of subsequent adulthood transitions might serve as an additional vehicle by which racial inequalities are perpetuated. This theoretical orientation is made further compelling by stark black-white differences in mortality that exist across all ages that are likely to have limited the relative availability of kinship resources (especially parents) for black versus white minors throughout U.S. history.

The goal of the present study is not to determine whether differences in kin availability actually do or do not lead to real long-term social support. The sheer volume of debate on the question of whether single parenthood is or is not ultimately disruptive to child development (e.g., see discussions in Barber and Eccles 1992; Biblarz and Gottainer 2000) demonstrates the complex requirements of attempting such an investigation. In fact, previous research has shown that the mere presence of family in the lives of individuals does not ensure social support, and may actually lead to more strain than gain (Umberson, Crosnoe, and Reczek 2010). Additionally, communities with even extreme resource deficits and sparse kinship networks are able to mobilize extended and affective kin to “fill in” the gaps left by dead or absent family members (Stack 1974).

Thus, the measures of kin availability presented in this chapter do not imply anything about the quality of familial social support; that is a product of complex social adaptations and negotiations. Rather, kin availability as a component of kinequality highlights persistent inequalities in the boundaries of biological kinship that limit or make necessary such adaptive negotiations.

Familial Life Course Expectations

Another plausible mechanism by which race differences in kinship may lead to meaningful differences between black and white Americans is by altering normative expectations that govern the timing of particular kinship transitions. The term “expectation” is here invoked in both its technical and colloquial usages, signifying both statistical averages as well as psychological feelings of anticipation. In both usages, what is stressed is the importance of sequence (rather than availability) of kinship relations over a lifetime. Historically consistent differences in the distribution of kinship relations over the lifespans of black and white Americans may lead to different average age trajectories of kinship transitions – trajectories that are then re-inscribed into the collective memories of those populations and passed on to subsequent generations as normative familial life course expectations. In this chapter, I pay special attention to particularly disruptive life course transitions (e.g., the transition to orphanhood) experienced in pre-adult ages, initiated by the death of kin.

There is substantial evidence that wellbeing in childhood is an important determinant of wellbeing at all subsequent stages of life [Case, Fertig, and Paxson (2005); Haas (2008); Palloni et al. (2009)). In this context, the death of a close family member has the potential to be a particularly disruptive experience in youth that can lead to significant consequences to wellbeing throughout the remaining years of life. Indeed, the loss of a parent during childhood and adolescence has been linked to worse depression outcomes in adulthood (Brown and Harris 1978; Finkelstein 1988; Wickrama et al. 2008). The possibility for such psychological mal-adjustment in the face of parental death during childhood signals the importance of timing in determining our ability to adequately cope with potentially disruptive family life course transitions. Whether due to cognitive under-development, lack of relevant behavioral scripts, or the increasing unlikeliness of a given transition, individuals who experience these transitions at earlier ages may be less equipped to cope with them than similar individuals undergoing the same transition at older ages.

Berger and Luckmann (1966), in the *Social Construction of Reality*, speak of the "location of death" as an essential component in the proper constitution of our symbolic universes:

> *"The experience of the death of others and, subsequently, the anticipation of one's own death posit the marginal situation par excellence for the individual. Needless to elaborate, death also posits the most terrifying threat to the taken-for-granted realities of everyday life. The integration of death within the paramount reality of social existence is, therefore, of the greatest importance for any institutional order… All legitimations of death must carry out the same essential task – they must enable the individual to go on living in society after the death of significant others and to anticipate his own death with, at the very least, terror sufficiently mitigated so as not to paralyze the continued performance of the routines of everyday life."* (Berger and Luckmann 1966, p.101)

Writing on the impact of historical demographic changes on family life, Hagestad (1986) notes the increasing importance of death's "location" in the lives of affected individuals:

> *"Recent changes in mortality have made the time of death more predictable and have clarified the meaning of the term 'untimely death.' Today, the death of parents before their children has reached midlife, and the death of their children – at any age – would be assigned that label. Because such events are not expected, they may be more traumatic now than they were in the past, for they catch us in the vulnerability of unpreparedness. They are also likely to be lonely transitions, neither shared nor fully understood by peers."* (Hagestad 1986, p.120)

To the extent that the distribution of such 'untimely' familial life course events (e.g., the death of a parent) is conditioned by race differences in mortality, individuals of certain race groups are more frequently forced into situations where their normative life course expectations must be re-evaluated in light of more frequent exposure to "unexpected" events. Indeed, the additional psychological burden that this process of re-evaluation demands may well be a contributing factor to the persistence of observed childhood inequalities between black and white populations that eventually lead to race differences in wellbeing in later adulthood (Geronimus 1992; Haas and Rohlfsen 2010).

It should be noted that the possibility of harm due to unexpected life course transitions is simply that: a possibility. There is evidence that children and adolescents are quite resilient in the face of early-life disruption, such that often there are no lasting impacts on adult wellbeing (Steinberg and Morris 2001). The purpose of the present study, therefore, is not to determine whether differences in expected familial life course trajectories do or do not lead to actual differences in wellbeing. Rather, these differences as a component of kinequality are meant to highlight persistent inequalities in the timing and sequence of transitions into different kinship relations that limit or necessitate these possibly stressful psychological and relational re-adjustments. For example, the degree to which black and white Americans differ with regard to when and how frequently they experience the loss of different family members at childhood and adolescence strongly determines inequalities in early-life exposure to bereavement and forced transitions out of familiar kinship relations. These inequalities may alter the internal calculus of affected youth such that future behavior becomes conditioned by perceptions of life course risk and reward that differ strongly by race.

Methods

As noted in the previous chapter, demography provides a ready analytic apparatus for measuring intergenerational effects on kinship due to changes in mortality and fertility over historical and individual time. The present study leverages this machinery via a demographic microsimulation framework to examine the role of race in demarcating important differences in kinship patterns over individual and historical time in the United States.

Demographic microsimulation

Microsimulation provides many advantages as a demographic projection technique. Foremost is the ability to generate complete individual-level data from aggregate-level inputs. With mean age-specific rates of fertility and mortality, it is possible to re-create complete genealogical records for each simulated individual, thus allowing for construction of full kinship networks at any moment in each simulated individual's life time. While similar results could potentially be obtained via analytic methods (e.g., deriving proportions in different kinship states using stable population equations), these techniques become intractably complex as the number of possible simultaneous kin relations expands to include a wider range of possible combinations.

Microsimulation with SOCSIM

The present study employs SOCSIM, a well-validated microsimulation tool,[3] to simulate fictive groups of individuals calibrated to match the demographic behavior of black and white populations over the period 1910 to 2009 (using U.S. National Vital Statistics System life tables and central fertility data).[4] Within SOCSIM, these simulated individuals "live" out their digital lifespans: creating offspring and dying within the parameters set by the observed fertility and mortality schedules.[5] At the conclusion of each simulation, SOCSIM returns a complete dataset with the full demographic characteristics of each individual, including all the genealogical variables necessary to reconstruct that individual's entire kinship network.

To facilitate comparisons between black and white kinship trajectories, I run two separate batches of these simulations—once with fertility and mortality rates for white Americans and a second time with the corresponding rates for black Americans. Other than the different fertility and mortality inputs, the white American and black American simulations are exactly identical in specification. For the purposes of this analysis, I hold marriage, dissolution, and re-marriage rates constant across races. This choice is made deliberately due to lack of reliable race-stratified, nationally-representative marriage data for the large span of time here examined. The results of these analyses should therefore be interpreted as those black-white differences due to differences in fertility and mortality trends net of differences in marital behavior. The main opportunity that is lost by this choice of specification is the ability to account for differences in kinship networks due to divorce and re-marriage (i.e., "half" kin relations).

Finally, to reduce variation due to the randomness of any single simulation, I run each race-specific simulation 25 times and average measurements (weighted by sample size) across all runs. As for the "mechanical" limitations of traditional microsimulation

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[3] Additional information on SOCSIM may be found in Hammel and Wachter (1976), K W Wachter (1997), and online at http://lab.demog.berkeley.edu/socsim.

[4] See appendix section 'A1' for a description of the calibration procedure.

[5] To enable simulation of complete lifespans for individuals "born" in more recent decades, vital rates for 2009 (the latest available at the time of this writing) are held fixed at the end of the simulation until the last individual "born" in 2009 has passed away.

(discussed earlier), I remedy those issues by implementing a set of inheritance factors that allow for mother-daughter correlation of fertility outcomes.[6]

Operating definitions

It has been suggested that black-white inequalities in wellbeing might be profitably studied following a careful application of the life course perspective (Colen 2011; Haas and Rohlfsen 2010). Under this perspective, outcomes are conditioned by accumulated advantage and disadvantage over subsequent "stages" of life experienced within particular historical contexts. Operative concepts within the life course paradigm are transitions and trajectories, where the former denotes qualitative shifts into and out-of new roles and behaviors, and the latter denotes the particular sequences and timings of these shifts (Elder 1985, 1998).

In the present study, I have adopted the life course language of "transitions" and "trajectories." To this conceptual repertoire I have added the network analytic concept of "relation" as a state defined by a relational linkage or "tie" (Wasserman and Faust 1994). "Transitions" are thus the movements into and out of these "relations" initiated by the breaking and forming of relational ties; and "trajectories" are the temporal sequences of these transitions.

With this vocabulary in mind, I operationalize a set of kin relations to analyze by allowing ages at kin birth and death to demarcate the boundary points that mark transitions into and out of different kin relations (Table 1).

Table 1. Operating definitions of kin relations

Relation	Definition
Defined by life of kin	
Grandparent	At least one grandchild alive
Parent	At least one child alive
Sibling	At least one sibling alive
Child	At least one parent alive
Grandchild	At least one grandparent alive
Defined by death of kin	
Former Sibling	All siblings deceased

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[6] Following on the strategy employed by K. W. Wachter, Blackwell, and Hammel (1997), I set these inheritance factors in accordance with data presented in Pullum and Wolf (1991).

Former Parent	All children deceased
Single Orphan	One parent deceased
Maternal Orphan	Mother deceased
Paternal Orphan	Father deceased
Double Orphan	Both parents deceased
Grand-Orphan	All grandparents deceased

Data

Data that can be used to directly explore kinship trends are difficult to find. Datasets that do include information on kinship networks are often sparse and rarely complete enough to encompass the full range of kin relations held by respondents throughout the course of their lives. To overcome these data limitations, I rely on microsimulation with SOCSIM to generate complete kinship data from which to derive estimates of transition rates into and out of kinship relations over time.

While these simulated data are essentially free of data quality issues, the same is not necessarily true for the observational data from which they are derived. Any systematic errors in measurement or reporting in the underlying U.S. mortality and fertility rate schedules are likely to be propagated in these simulations, potentially biasing results. In particular, if the quality of data collection or data transcription efforts differ significantly by race of respondent in the original input data, then the reliability of this study's black-white kinequality estimates may suffer.

For the simulations conducted in this study, race-stratified life tables and central fertility rate schedules from the U.S. National Vital Statistics System (NVSS) are utilized as inputs.[7] Fortunately, these data are generally well-harmonized across periods with highly reliable estimates of black and white vital rates, and minimal evidence of black-white heterogeneity in error (Arias et al. 2008; Rosenberg et al. 1999). Nevertheless, to ensure that even minimal race differences in reporting error would not qualitatively change the nature of the present study's results, an alternative set of simulations were run with white and black mortality rate inputs adjusted for the 1% and 5% over-estimation (respectively) reported by Rosenberg et al. (1999). Happily, key measures of black-white differences in lifetime kinship probability and mean kinship transition ages calculated from these adjusted simulations demonstrated less than 2% deviation, at most, from those presented in the present study.

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[7] See appendix section 'A2' for a summary table of input parameters.

Analysis

Analysis of the simulated data proceeds in two steps. First, between-race comparisons are conducted for select 10-year birth cohorts: 1940-50, 1980-90, and 2000-2010. These cohorts are chosen to represent individuals who, in 2015, fall between the ages of 65-75, 25-35, and 5-15, respectively. In subsequent discussions, I refer to these groups loosely as the *senior*, *adult*, and *youth* cohorts. Examination of race differences within each of these cohorts allows for the characterization of common features of black-white kinequality. Between-cohort comparisons of race differences in select outcomes characterize the historical trends in black-white kinequality. Considered in sequence, these comparisons provide clues as to whether black-white kinequality is likely to increase or decrease over future generations.

Outcome measures are split into two categories corresponding to each of the two dimensions of kinequality. *Kin availability* is characterized by life-time average age-profiles of time spent in different kin relations defined by the life or death of kin (see Table 1), and age-specific probabilities of transition into and out of these kin relations. *Familial life course expectations* are characterized by average ages at which deaths of different kin are first experienced, and the age-specific probabilities of experiencing the death of different kin. As discussed in previous sections, special emphasis will be placed on outcomes observed in the pre-adult years.

Results

Kin availability

Figure 3 presents average durations (in years of age) spent in different kin relations for the "adult" cohort (born in the period 1980-1990).[8] The top plot shows durations for those relations defined by living kin, while the bottom plot shows durations for those relations defined by deceased kin (measurements of orphanhood relations are restricted to the pre-adult years thus capturing pre-adult orphanhood). These age-profiles of average kinship durations are calculated for only those individuals who have ever inhabited the specific kinship relation in question, and so should be interpreted as conditional measurements of kin availability.[9] Lifetime probabilities of ever having made

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[8] The general patterns of black-white differences in kinship duration observed in the "adult" cohort are similar to those observed in both the "youth" and "senior" cohorts.

[9] Since kinship relations are defined by the existence (or absence) of particular types of kin (see Table 1), statements about time spent in different kin relations naturally implies statements about the likely availability of those kin.

the transition into each of the kinship relations are given in parentheses next to each horizontal duration bar.

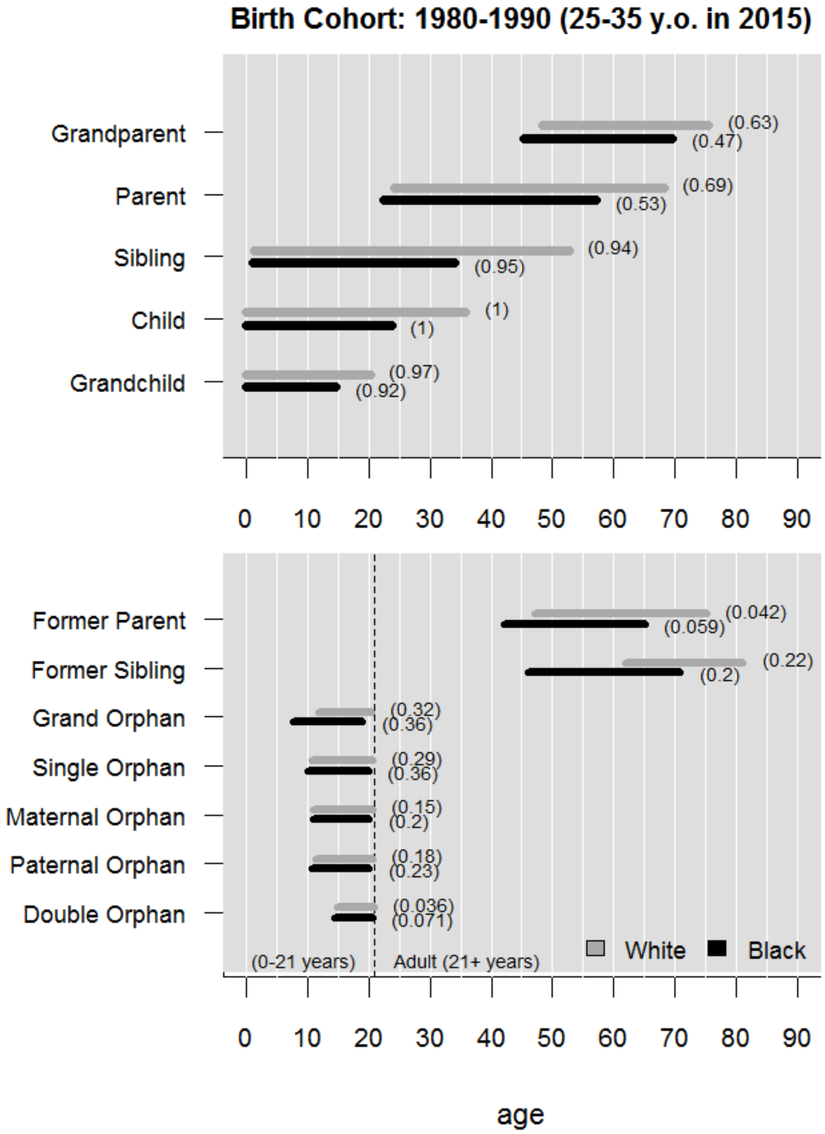

Figure 3. Average durations (over age) spent in different kin relations by race for the 1980-1990 birth cohort. The age profiles are contingent on ever having spent time in a given relation. The numbers in parentheses to the right of each horizontal bar gives the proportion of all individuals who have ever spent time in that particular relation. The top plot includes kin relations defined by living kin, while the bottom plot includes kin relations defined by deceased kin.

The most notable black-white differences in the age-profiles of relations defined by living kin are earlier average ages of transition into kin relations and shorter durations for black individuals relative to their white counterparts. Additionally, black individuals are less likely to have ever inhabited each of these kin relations over their lifetime (with the exception of childhood, and perhaps siblinghood). Earlier average ages of transition reflect higher fertility of the black population at earlier ages that make different types of kin available sooner. The shorter duration and lower lifetime likelihoods of inhabiting these relations reflect the higher mortality of the black population at earlier ages that make it less likely that individuals live long enough to transition into certain kinship relations and more likely that they transition out of those relations via death.

As for kin relations defined by deceased kin, black individuals transition into each of these relations at earlier ages relative to their white counterparts. However, black individuals also spend more time inhabiting each of these relations (with the exception of former parenthood); and for many of the orphanhood relations, they are much more likely to have transitioned into them in the first place. All these patterns are driven predominantly by the higher rates of mortality at earlier ages for the black population that trigger earlier transitions into these kinship relations.

Figure 3 highlights the general pattern of black-white differences in lifetime kinship probability and duration. These patterns are quantified by differences in average ages of transition into each kin relation, the differences in average durations spent in each relation, and the ratios of lifetime probabilities of ever having transitioned into each relation (Table 2).

Table 2. Race differences in mean transition ages, durations, and lifetime transition risks by birth cohort

Relation[1]	Difference in starting age (white – black)	Difference in duration (white – black)	Lifetime risk ratio (black/white)
“Senior” Cohort: 1940-1950			
Grandparent	2.87	2.62	0.72
Parent	1.64	7.06	0.78
Sibling	0.13	15.32	1.00
Child	0.00	10.63	1.00
Grandchild	0.00	5.29	0.95
Former Parent	2.73	3.50	1.49
Former Sibling	12.32	-3.52	0.93
Grand Orphan	3.85	-2.37	1.12
Single Orphan	1.02	-0.39	1.20
Maternal Orphan	0.66	-0.11	1.31
Paternal Orphan	0.72	-0.19	1.25
Double Orphan	0.39	-0.22	1.96
“Adult” Cohort: 1980-1990			
Grandparent	3.06	2.86	0.75
Parent	1.67	9.33	0.79
Sibling	0.09	18.47	1.00
Child	0.00	12.08	1.00
Grandchild	0.00	5.60	0.95
Former Parent	4.94	5.08	1.41
Former Sibling	15.99	-5.73	0.91
Grand Orphan	4.03	-2.58	1.12
Single Orphan	0.63	-0.05	1.96
Maternal Orphan	0.11	0.40	1.27
Paternal Orphan	0.57	-0.05	1.38
Double Orphan	0.30	-0.10	1.24
“Youth” Cohort: 2000-2010			
Grandparent	3.43	1.83	0.83
Parent	1.87	7.19	0.82
Sibling	0.13	17.43	1.00
Child	0.00	12.37	1.00
Grandchild	0.00	5.35	0.95
Former Parent	2.65	3.63	1.19
Former Sibling	14.69	-6.51	0.92
Grand Orphan	3.83	-2..63	1.23
Single Orphan	0.94	-0.37	1.50
Maternal Orphan	0.16	0.31	1.70
Paternal Orphan	0.90	-0.41	1.57
Double Orphan	0.50	-0.37	3.03

For relations defined by living kin, the general pattern of earlier mean transition ages, shorter mean durations, and lower lifetime transition probabilities for black versus white individuals holds for each birth cohort. However, across cohorts, the magnitude of these differences undergo some changes: differences in mean transition ages increase, differences in relative transition risk decrease, and differences in mean durations first increase for the "adult" cohort (relative to the "senior" cohort) and then decrease for the "youth" cohort (relative to the "adult" cohort). For relations defined by deceased kin, race differences in average transition age, duration, and lifetime transition probability decrease on net over cohorts, but with notable exceptions for maternal orphanhood, paternal orphanhood and double orphanhood – all of which occur earlier, for longer durations, and more frequently for black individuals than white individuals over time.

Figures 4 and 5 present plots of age-specific probabilities of inhabiting select kinship relations (childhood, siblinghood, parenthood, maternal orphanhood, paternal orphanhood, and grand orphanhood) comparing the likelihood of black versus white individuals inhabiting those relations at each age. In contrast to the lifetime kinship durations presented in Figure 3, these are unconditional measures of kin availability: they characterize the likelihood at each age of inhabiting a particular kinship relation for *all* individuals in the population.[10] Here, risk of orphanhood is measured across all years of life (not just pre-adulthood).

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[10] See appendix section 'A3' for a fuller treatment of the relationship between kin availability and probability of kinship.

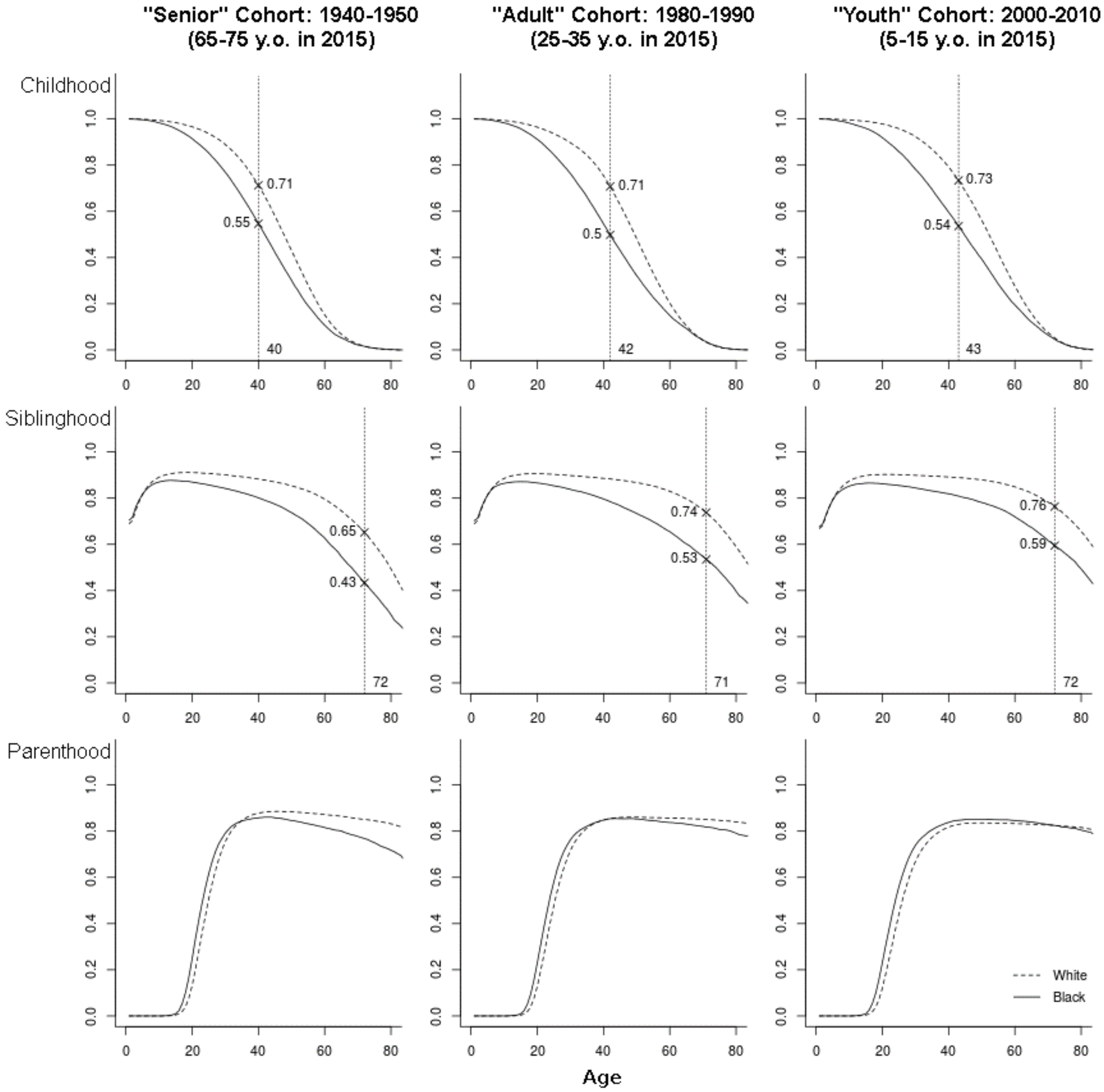

Figure 4. Probability of inhabiting select kinship relations defined by living kin (childhood, siblinghood, parenthood) by age and cohort. The vertical guide lines indicate the ages at which the black and white probability curves most differ. No guide lines are included for the 'Parenthood' relation due to close proximity of the race-specific curves.

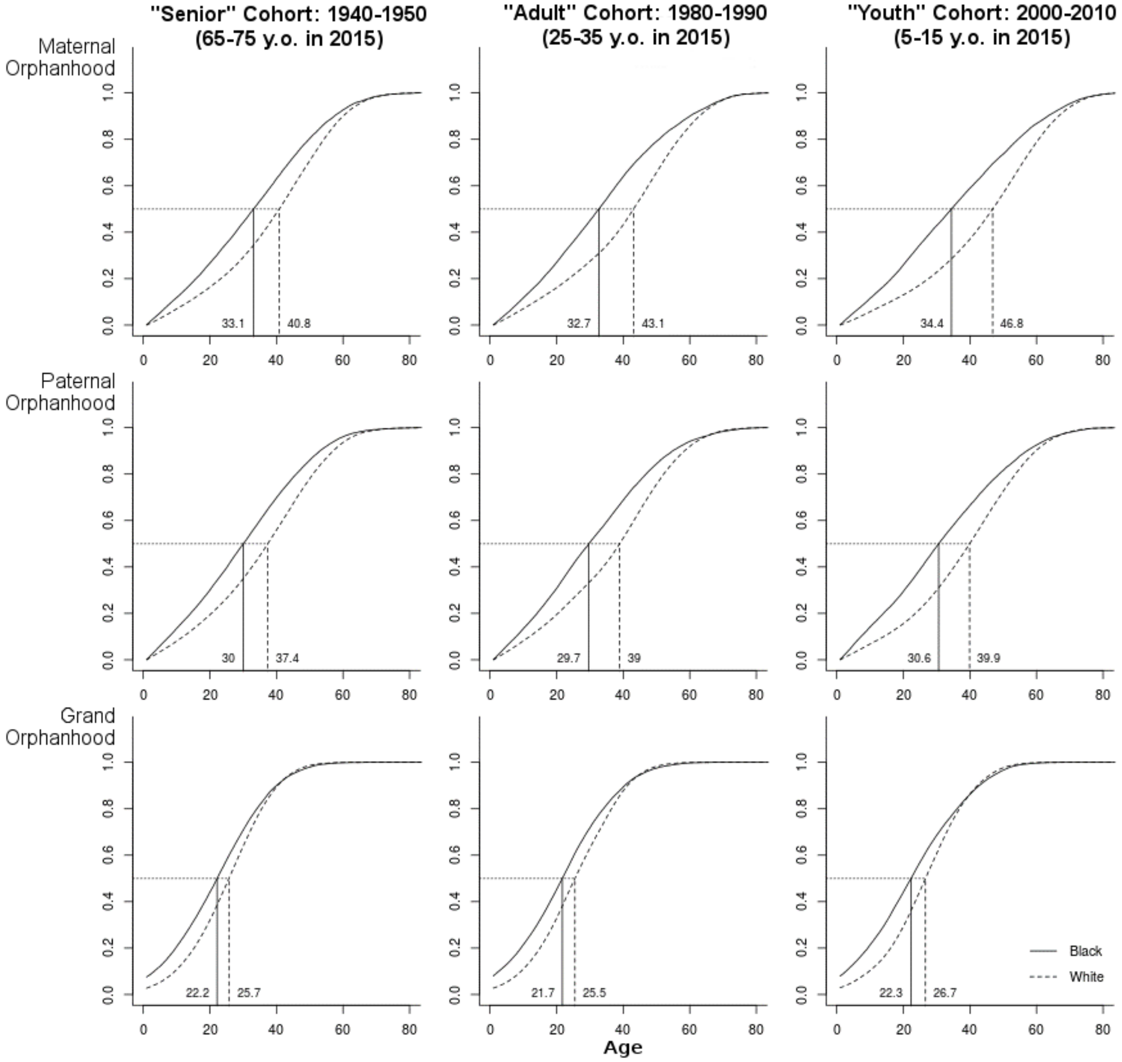

Figure 5. Probability of inhabiting select kinship relations defined by deceased kin (maternal orphanhood, paternal orphanhood, grand orphanhood) by age and cohort. The vertical guide lines indicate the median ages at which the black and white populations are expected to have transitioned into each of these relations.

In general, black individuals are less likely than their white counterparts to inhabit kin relations defined by living kin, for most years of their lives (Figure 4). For example, at the point of greatest black-white difference (age 42), 55% of the black “adult” cohort are sons and daughters (i.e. co-existent with a living parent), while a substantially higher percentage, 71%, of the white “adult” cohort remain sons and daughters. Similarly, 53% of the black “adult” cohort are siblings (i.e. co-existent with a living sibling) at the point of greatest black-white difference (age 71), while 74% of the white “adult” cohort remain siblings at that same age. These trends reflect higher mortality among kin in the black population that make it less likely that different types of kin will be alive at each age to form the necessary relational linkages. The one clear exception to the general pattern seems to be for parenthood (i.e., co-existence of a living child): black individuals are slightly more likely to be parents than their white counterparts until about age 40 when the pattern flips. This trend reflects higher fertility and mortality at earlier ages for the black population and higher fertility at later ages for the white population. For these kinship relations (childhood, siblinghood, and parenthood), race differences in the age-specific probabilities of kinship remain consistently present for each birth cohort, but with evidence of some reduction over subsequent cohorts.

Turning to relations defined by deceased kin, we see that black individuals are at higher risk for maternal orphanhood, paternal orphanhood, and grand orphanhood at all ages, relative to their white counterparts. Thus, 50% of the black population in the “adult” cohort are maternal orphans by age 32.7, while the white “adult” cohort does not reach this proportion until 10.4 years later at age 43.1. Similarly, 50% of the black “adult” cohort are paternal orphans by age 29.7, while the white “adult” cohort does not reach this proportion until 9.3 years later at age 39. Finally, 50% of the black population in the “adult” cohort are grand orphans by age 21.7, while the white “adult” cohort does not reach this proportion until 3.8 years later at age 25.5. These race differences in age-specific orphanhood probability not only persist, but grow in magnitude over subsequent birth cohorts.

Familial life course expectations

To provide a more intuitive sense of how race changes the timing and sequence of kinship transitions over a lifetime, I plot the typical ages at which black and white individuals first experience the death of different kin (Figure 6).[11] From this perspective we can see that the distribution of kin death is skewed heavily toward the earlier ages for

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[11] Conditional, of course, on ever having those types of kin and living long enough to see their passing.

black individuals relative to their white counterparts. This results in a situation where confrontation with familial death for all types of kin are likely to occur earlier for black individuals. For example, the first parental death in the life of an average black individual in the "adult" cohort occurs 8.02 years sooner. Perhaps more concerning is the higher frequency of kin deaths during the pre-adult years. By age 21, black individuals are likely to have observed the passing of a sibling, parent, and grandparent; while their white peers are likely to have only observed the passing of a grandparent. This race difference in ages at first death of kin is present in each birth cohort, but becomes somewhat less pronounced over subsequent cohorts.

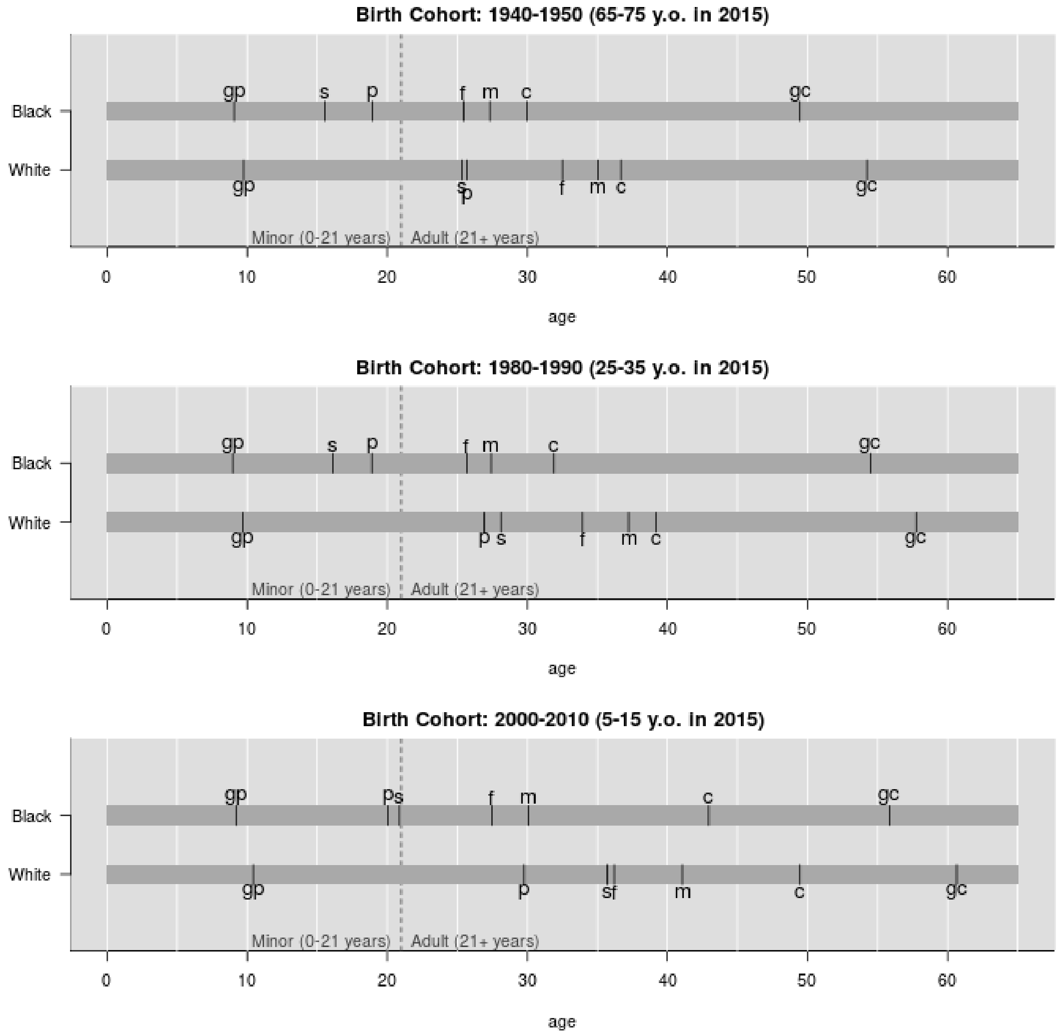

Figure 6. Mean ages at which deaths of different kin are first experienced (by race and birth cohort). 'gp' = grandparent, 'p' = parent, 'm' = mother, 'f' = father, 's' = sibling, 'c' = child, 'gc' = grandchild

Figure 6 highlights the differences in likely sequence and spacing of kin deaths experienced over a lifetime, while Figure 7 highlights differences in the likely magnitude of exposure to those deaths at each age.

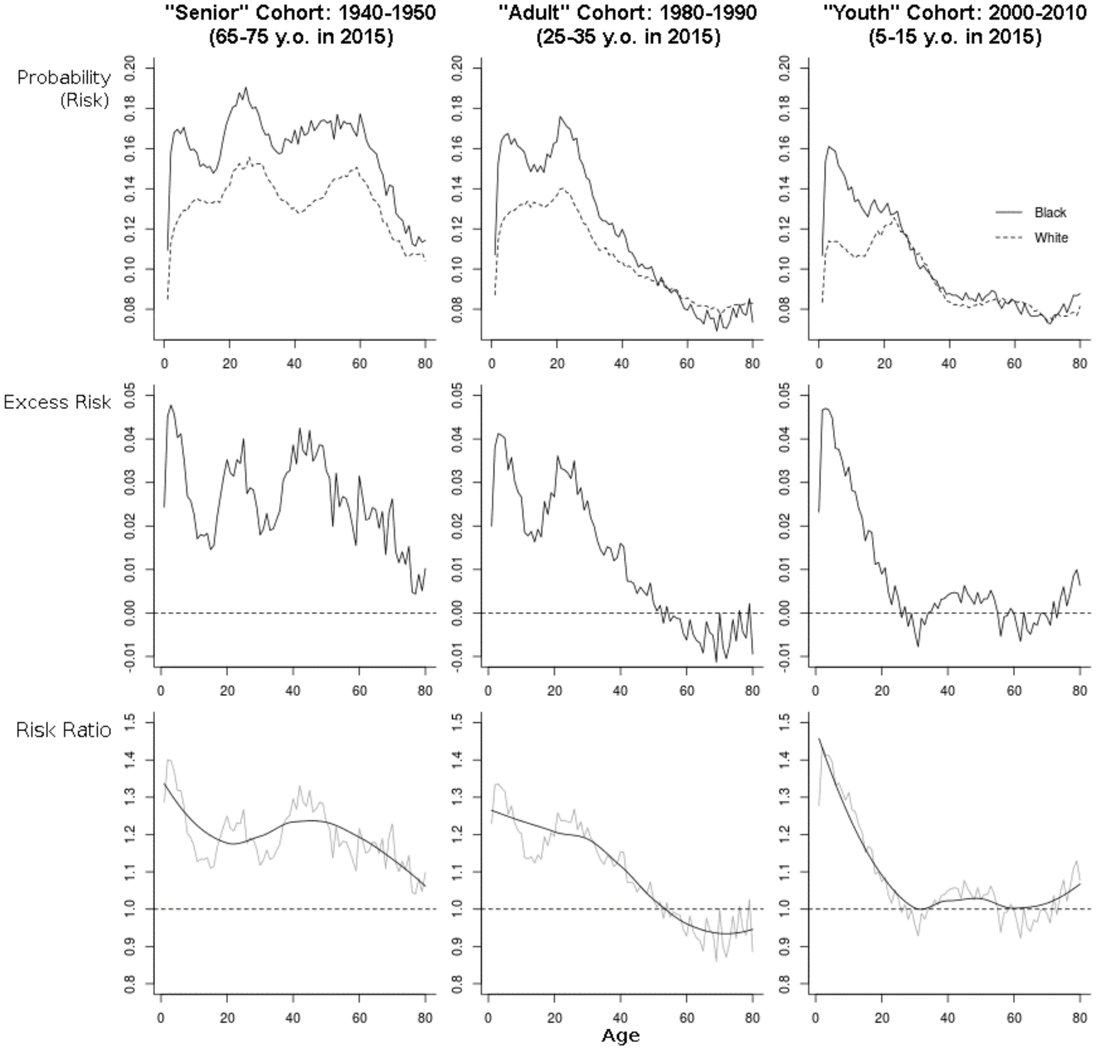

Figure 7. Probability of experiencing the death of select kin (grandchild, child, sibling, parent, and grandparent) by age. The top row shows race-specific probability curves. The middle row shows the absolute difference (black-white) of these probability curves. The bottom row shows the ratio (black/white) of these probability curves: the jagged gray curve represents the raw ratios at each age, and the solid black curve is a LOESS smoother applied to the raw ratios.

Examining the aggregate risk of death for a set of close kin (grandchildren, children, siblings, parents, and grandparents), we see that black individuals are more likely than their white counterparts to experience kin death at nearly every age. By age 60, black individuals in the “adult” cohort have been exposed to 1.14 times higher risk of kin death, on average, at each age – resulting in 105.8% more (“excess”) kin deaths. Overall, this race difference in kin mortality seems to become less pronounced over subsequent cohorts (with even some crossover at older ages for the “adult” and “youth” cohorts). However, the relative gap at the earliest ages remains high without any clear indication of convergence over time: By age 21, the average black individual in the “senior”, “adult”, and “youth” cohort is likely to have been exposed to risk of kin death 60%, 58%, and 58% (respectively) in excess of what the average white individual is expected to have experienced.

Finally, I decompose the aggregated risk of kin death into kin-specific risks (Figure 8). Doing so, we see that the black and white aggregate curves differ not only in their shape and magnitude, but by the relative contributions of risk due to different types of kin death. Notably, deaths of parents and siblings tend to be more important sources of familial mortality exposure in the pre-adult years for black minors than for their white counterparts such that roughly a third of all kin death experienced by black minors are the deaths of parents and siblings, while parents and siblings represent only about a fifth of the deaths experienced by white minors. This pattern remains relatively constant across all birth cohorts.

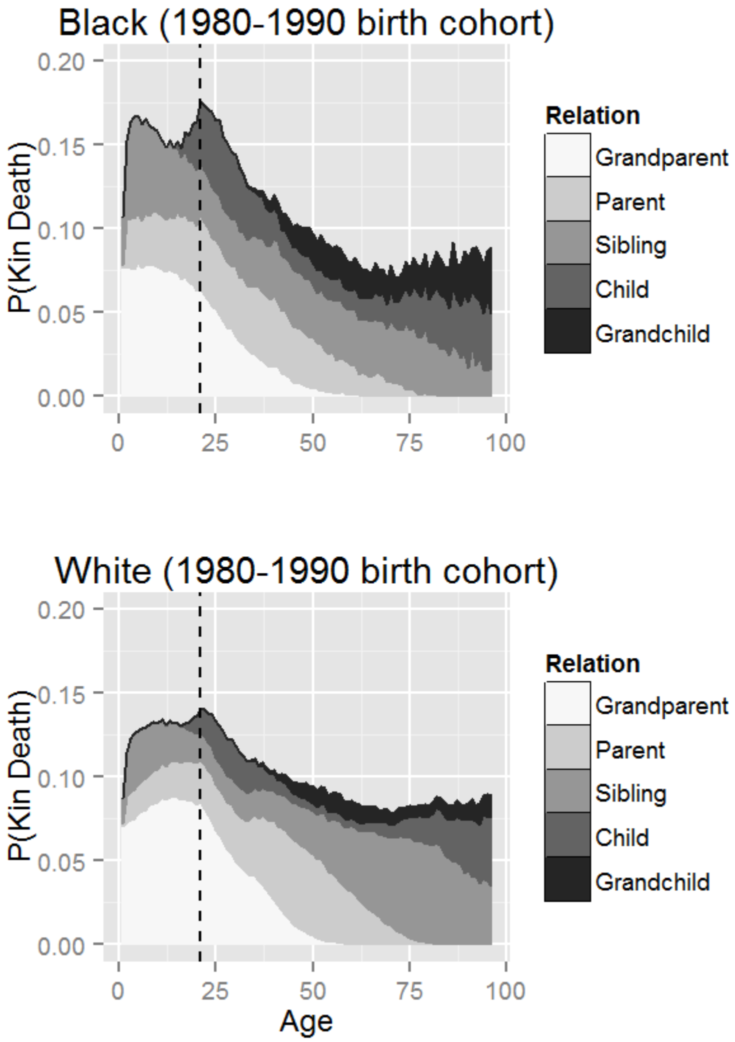

Figure 8. Probability of experiencing the death of select kin (grandchild, child, sibling, parent, and grandparent) by age, decomposed into constituent relations. A vertical guide line is drawn at age 21 to emphasize trends in the pre-adult (0-21) years. Race-stratified plots for the other two birth cohorts show similar patterns.

Discussion

In this work I have defined the concept of “kinship inequality” (or kinequality) to mean differences in family due to differences in demography. This concept provides analytically-tractable insights into the ongoing impact on family life due to the making and breaking of kinship ties by birth and death. In this vein, the death of an individual is understood not only as the ultimate disruption in the life of the recently-deceased, but as a potential source of ongoing disruption for her family and future generations. The major forms that this disruption can take are altered kin availability and altered familial life course expectations. These are the two dimensions of kinequality that I have discussed in this work, and have characterized for black and white American populations over the last century.

In summary, black Americans are likely to have had fewer available kinship resources at most ages relative to their white peers throughout most of the past century, leading to earlier orphanhood, lower lifetime probabilities of transitioning into most kinship relations and shorter durations spent in them once there. By age 21, black Americans born in the period 1940-1950 are likely to have suffered 60% more deaths in the family (with a greater proportion attributable to deaths of siblings and children), on average, than white Americans born in the same period, and they are likely to have experienced these deaths at much earlier ages. Sixty years later, the trend is expected to persist: 58% more familial deaths experienced by black minors born in the period 2000-2010.

This overall picture of black and white kinship trajectories – the former characterized by relatively early and frequent exposure to death in the family and a subsequent dearth of familial support opportunities; the latter by relatively late and infrequent exposure to death in the family and a consequent abundance in familial support opportunities – lends new empirical support at the national level for related findings reported by past studies of black and white family life conducted at more local scales (e.g., Bankston and Pattillo-McCoy 2000; Harding 2010; Stack 1974). The findings described here also corroborate and expand on those reported by prior studies of national black-white family differences, which find increasing proportions of single parent families among black American households (Ruggles 1994). Though recent research on parental absenteeism has focused on low marital rates, divorce, separation, and incarceration (Cherlin 2010), the present study demonstrates the continuing importance of parental mortality in the continuation of this trend.

While the consistently large and growing race differences in orphanhood outcomes merit considerable concern and attention, it is worth re-iterating that the majority of the race gaps observed for other kinship relations display signs of slow convergence over time: Black-white differences in lifetime and age-varying probabilities of transition into these kin relations as well as differences in the time spent in them seem to shrink, on net, over successive birth cohorts. To the extent that age-specific rates of fertility and mortality continue to converge for the black and white national populations, this trend is likely to continue.

An important limitation of this study is the exclusion of race differences in marital behavior. While the absence of marital differences in my simulations disallowed exploration of spousal and "half" kin relations, these omissions are not likely to have meaningfully influenced the general findings regarding kin availability and familial life course expectation for the relations that were included. Nevertheless, future research that incorporates reliable estimates of race-stratified rates of union, dissolution, and re-union would valuably expand the scope of any inquiry that seeks to characterize the kinship networks of black and white Americans.

Additionally, future work on black-white kinequality might usefully be enhanced by the explicit modeling of kin absence due to structural barriers other than death. Incarceration, in particular, has been (and continues to be) a strongly race-stratified process (Blumstein 1982, 1993; Pettit and Western 2004). Given known rates of incarceration, it is possible to incorporate time spent institutionalized into a demographic microsimulation framework as a form of socially-mediated "death," thus allowing for the direct estimation of impacts to kin availability and familial life course expectations due to incarceration.

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"Kinship inequality," by definition, is ultimately reducible to a straightforward set of kinship transition probabilities. However, by bundling these transition probabilities into a set of complementary measures—"kin availability" and "familial life course expectations" (each of which suggest a set of mechanisms by which differences in kinship may be translated into inequalities in individual wellbeing)—I have sought to enhance the heuristic value of the kinequality concept by offering a language with which sociologists of the family might more easily expand the scope of their inquiry: to not only to speak about surface level differences in kinship networks at a particular moment in time, but to speak more deeply about the temporal distribution of kinship resources over the entire life course, the resulting sequence of kinship transitions, and the underlying demographic trajectories of individuals and their related kin which drive the entire process. But most critically, to speak of kinequality, is to speak of invisible adaptations.

Sociologists have long recognized that the family is achieved, that the achievement is rarely free, and that the cost is borne unequally by different members of our society. Kinequality provides an answer to the question: "Just how unequal is the cost?" For black Americans, the cost has been (and continues to be) higher than for their white peers.

Though disparities in kin availability and familial life course expectations does not necessarily lead to realized inequalities in family formation or individual wellbeing, it crucially demarcates the genealogical boundaries within which those inequalities must be negotiated and overcome. It is this inequality in the burden of adaptation due to the absence of related kin—*who is left*—and the presence of disrupted normative life course expectations—*when they leave*—that is ultimately what is at stake in black-white kinship inequality.

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Appendix to Chapter 2

A1. *Calibration of SOCSIM via Maximum Likelihood Estimation*
In order to recover results that are consistent with observed data, I calibrate my input rates against the known distribution of family sizes and life expectancies (TFR and e_0) at each ten-year interval from 1910 to 2009. This calibration is done via two scaling factors – θ_m and θ_f – that multiplicatively adjust the levels of the age-specific mortality and fertility inputs, respectively. What is thus assumed is confidence in the general shape of the age-specific mortality and fertility curves, but uncertainty regarding their magnitudes (Figure 1).

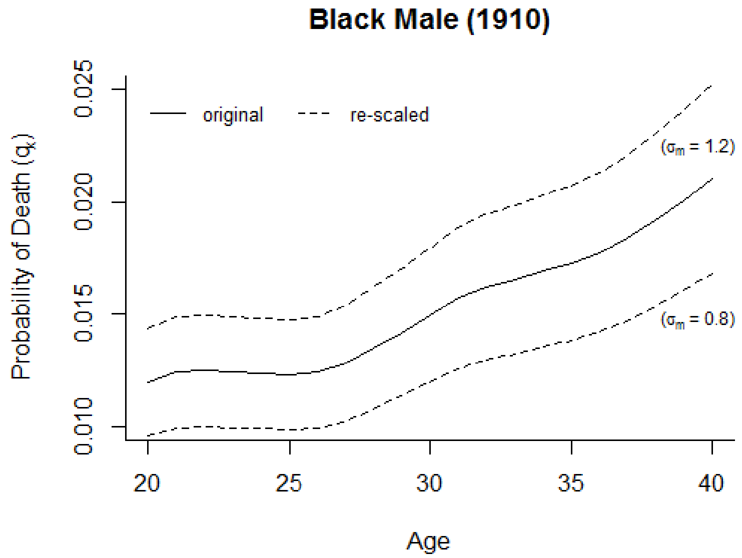

Figure A1-1. Example of re-scaled age-specific mortality curves. The area between the dashed lines demarcates the range of possible re-scaled values.

Procedurally, twenty candidate values are chosen (at even intervals) between the range 0.80 to 1.20 for each θ_m and θ_f parameter. This results in 400 possible (θ_m, θ_f) pairs. Each of these pairs are applied to the simulation's 11 sets of mortality and fertility inputs, and the simulation is then run to completion 25 times (for each pair of scaling factors) producing 25 unique values of TFR and e_0. The variation and average of these outcomes over the 25 runs is used to compute a likelihood estimate of observing the true values of the outcomes assuming that the simulated outcomes are normally distributed. In sum, what is produced is an estimated likelihood surface that varies by θ_m and θ_f for each of the 11 input rates used in the simulation (Figure 2). The (θ_m, θ_f) pair that generate the highest likelihood value is then chosen as the final re-scaling parameter set.

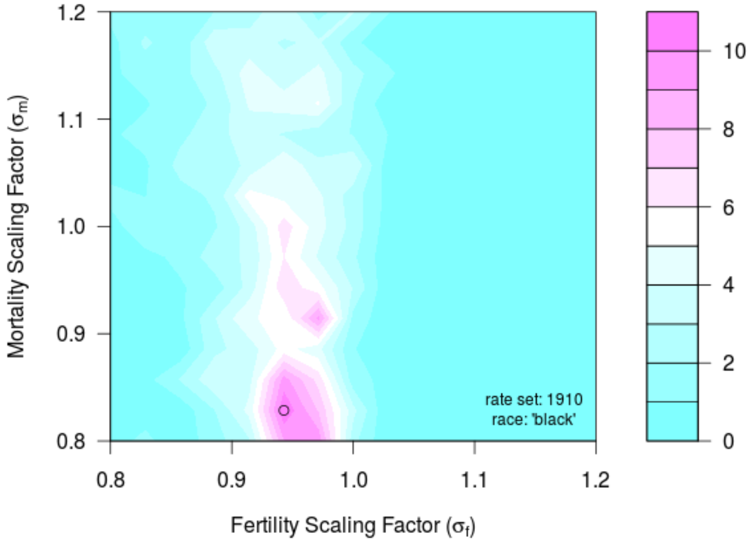

Figure A1-2. Example of estimated likelihood surface generated by the calibration procedure. The point marked by the hollow dot represents the (θ_m, θ_f) pair associated with the maximum likelihood value.

Thus in sum: (11 simulation input rate sets) x (400 re-scaling pairs) x (25 random simulations) = 110,000 calibration simulations are conducted to arrive at a final set of 11 re-scaling parameters. In concert, these 11 re-scaling parameters applied to our simulation's fertility and mortality inputs do a competent job of reproducing the expected TFR and e_0 values (Figure 3).

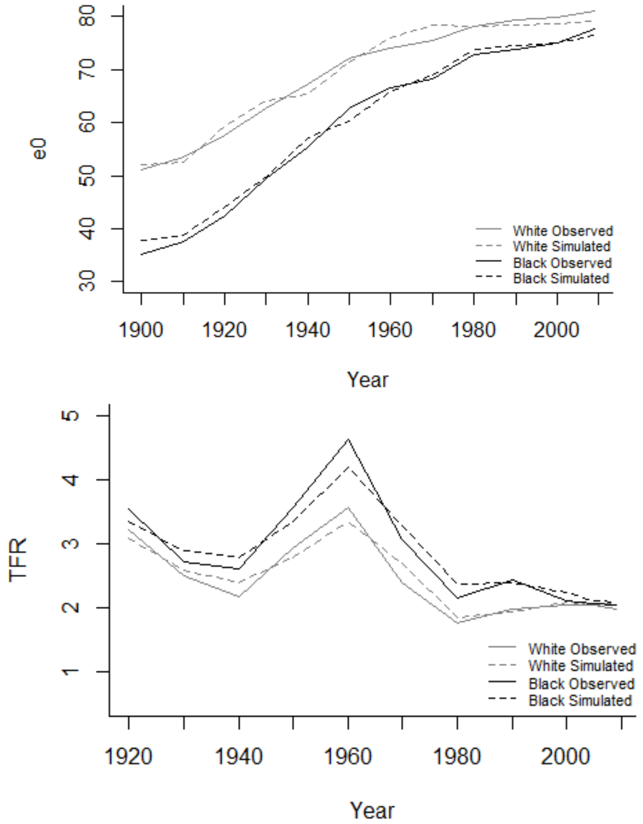

Figure A1-3. Period female life expectancy (e_0) and total fertility rate (TFR): observed and simulated values.

Traditionally, calibration of this sort has been done via an informed trial-and-error methodology, but advances in computational power allow for more systematic optimization procedures, such as the one presented here (for similar applications see: Ševčíková, Raftery, and Waddell 2007; Zagheni 2011). That being said, the need for these calibration steps should alert the reader to the danger of placing too much confidence in the exact magnitudes of effect being reported here (or in any other microsimulation study). These concerns, however, should be much less pronounced when considering the relative differences between two identically-configured simulations that vary only in their initial inputs as is the case in the present study.

A2. *Summary of simulation input parameters (by race)*

White American

Period	Total Fertility Rate (TFR)	Life Expectancy at Birth (e_0) Male	Life Expectancy at Birth (e_0) Female
1900-10	3.219	48.23	51.08
1910-20	3.219	50.23	53.62
1920-30	3.219	55.30	57.52
1930-40	2.506	59.12	62.67
1940-50	2.177	62.81	67.29
1950-60	2.945	66.31	72.03
1960-70	3.576	67.55	74.19
1970-80	2.405	67.94	75.49
1980-90	1.759	70.82	78.22
1990-2000	1.989	72.72	79.45
2000-09	2.049	74.78	79.99
2009-beyond	1.990	76.40	81.20

Black American

Period	Total Fertility Rate (TFR)	Life Expectancy at Birth (e_0) Male	Life Expectancy at Birth (e_0) Female
1900-10	3.556	32.54	35.04
1910-20	3.556	34.05	37.67
1920-30	3.556	40.45	42.35
1930-40	2.734	47.55	49.51
1940-50	2.618	52.26	55.56
1950-60	3.579	58.91	62.70
1960-70	4.647	61.48	66.47
1970-80	3.077	60.00	68.32
1980-90	2.154	64.10	72.88
1990-2000	2.454	64.47	73.73
2000-09	2.121	68.17	75.16
2009-beyond	2.048	71.10	77.60

NOTE: 1920 fertility rates used for earlier periods due to data inadequacy

A3. *The Relationship between Kin Availability and Probability of Kinship*

The availability of kin and the likelihood of transitions into and out-of kinship relations are directly related. Therefore, to speak of the availability of certain types of kin at certain moments in the life course is to simultaneously speak about the probability of inhabiting a given kin relation at that moment. Symbolically this relationship may be written as:

$$\bar{P}_x(r) = \frac{1}{n}\sum k_{ir}$$

where:

$\bar{P}_x(r)$ = mean probability of inhabiting a particular kin relation r at age x

i = index for an individual in the population of age x

n = total number of individuals i

k_{ir} = a binary (0/1) indicator that is 1 when kin, k, of relation r is alive[12] when individual i is age x.

For example, the probability of a randomly chosen individual of a particular age being a parent is given by the mean availability of children to people of that age in the population. For more complex relations (e.g. "single parent" requiring both the availability of a child and the un-availability of a spouse), the term k_{ir} may simply be expanded to a series of multiplicative terms that each indicate the presence (or absence) of the different required kin.

In the present study, I often present probabilities of kinship as a measure of kin availability. The intuitive relationship between these two concepts described here is what is implied in any discussions that employ both concepts.

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[12] Or dead, in the case of relations "defined by death" (see Table 1).

Chapter 3.

Imprisonment Risk and Prevalence in Black and White Families[1]

Two bodies of research have been particularly important in tracing the full reach of the carceral state into the American family during the era of mass imprisonment. The first uses formal demographic methods to document variations, by cohort, race, and education, in the cumulative risk of own and paternal imprisonment (Bonczar 2003; Bonczar and Beck 1997; Pettit and Western 2004; Western and Wildeman 2009; Wildeman 2009). The second explores the "connectedness" of prisoners to friends, family, and local communities (Clear 2007; Lee et al. 2015; Rose and Clear 2004; Wildeman and Turney 2014). Taken together, these bodies of research offer substantial insight into how individuals and families have been touched—directly or indirectly—by the rise in imprisonment rates since the early 1970s.

One element that is missing from these literatures, however, is analysis of how the prison boom has affected *extended family networks* and the exposure to imprisonment within such networks. Demographic research provides estimates of an individual's risk of own or paternal imprisonment, but not similar estimates detailing, for example, cousin's or uncle's imprisonment or—more importantly—the overall number of family members likely to ever be imprisoned. The connectedness literature, by contrast, does in some cases extend beyond the nuclear family, but, as is discussed below, data limitations curtail analyses of change over time and of connectedness to previously-incarcerated individuals.

In this chapter, I marry the methodological innovation of the demographic work on cumulative imprisonment risk with the research imperative of the connectedness literature. Building on lifetable approaches, I employ a microsimulation technique to infer lifetime trajectories of imprisonment from cross-sectional counts and rates.[2] This allows me to account for changes in the magnitude of imprisonment risk over historical time and in the distribution of that risk over ages and across races. Simply applied to individuals or parent-child dyads, these simulations would tell us little that previous demographic research has not. Indeed, I exploit this overlap: I replicate previous research

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[1] This research was conducted jointly with Peter Hepburn. A version of this work was published as: Chung, Pil H., & Peter Hepburn. 2018. Mass Imprisonment and the Extended Family. *Sociological Science*, 5:335-360.

[2] My focus is on prison rather than jail incarceration. As such, I use the term "imprisonment" throughout this chapter in reference to only this particular type of incarceration.

findings as a check on the plausibility of the assumptions that underlie my models (see Appendix A3). My major contribution is to go one step further and to estimate imprisonment risks within entire kinship networks for multiple cohorts of black and white Americans.

My findings indicate that the risk of imprisonment within extended kin networks has fallen earlier and more heavily upon black Americans than on white Americans: the average black American born at the height of the prison boom experienced the imprisonment of a relative for the first time at age 7, and by age 65 is expected to belong to a family where over 1 in 7 working-age relatives have ever been imprisoned. By contrast, the average white American who experiences the imprisonment of a relative does not do so until age 39, and by age 65 is expected to belong to a family where 1 in 20 working-age relatives have ever been imprisoned. Parents, partners, and children—the relations typically studied in research on the collateral consequences of imprisonment—constitute less than half of the overall exposure to imprisonment within kinship networks. I leverage the capacity of simulations to look toward the future, evaluating the potential effects of several proposed de-carceration goals. I find that national reductions in imprisonment rates could eventually lead to a meaningful narrowing of the race gap in kin imprisonment, but these reductions—even if implemented immediately—would not dramatically change the lifetime prevalence of kin imprisonment for those families whose members have already lived through the prison boom.

Background

Imprisonment curtails the benefits that arise from social networks in which currently- and formerly-imprisoned individuals are embedded (Comfort 2007). These collateral consequences have been theorized and demonstrated in several domains. Neighborhoods suffer declines in informal social control and collective efficacy as the proportion of residents who are current or former prisoners increases (Lynch and Sabol 2004). Schools are affected: even children without incarcerated parents fare worse academically as a school's proportion of incarcerated parents increases (Hagan and Foster 2012).

The extended family is a similar meso-level institution within which increased exposure to imprisonment yields poorer outcomes for its members. Higher rates of imprisonment within a kin network curtail available resources because (1) family members—including extended kin—pay significant immediate and long-term costs and (2) former prisoners are less able to contribute to kin support. The combination of these two factors can lead to the weakening of ties within the network (Braman 2004). Before detailing these costs entailed by kin imprisonment, I briefly describe racial variations in kin contact and support.

Race Differences in Kin Contact and Support

Not all kin networks are likely to be equally affected by the imprisonment of a member. Looser, more disconnected families may feel few effects; tightly-knit families engaged in regular contact and mutual support may feel effects more strongly. If there are no racial differences in the likelihood and magnitude of kin contact and support then, in aggregate, the effects of kin imprisonment should be felt equally across black and white families. If, however, one group displays consistently higher levels of contact and support, then that group may be particularly hard-hit by the effects of kin imprisonment.

Available evidence supports the latter premise. Research suggests that black Americans are far more likely to co-reside with a family member than white Americans (Keene and Batson 2010). Compared to white individuals, black individuals live in closer physical proximity to their kin, have more kin available locally, and have more frequent contact with those family members (Ajrouch, Antonucci, and Janevic 2001; Taylor et al. 2013). Findings on the exchange of support within black and white families are mixed. A number of studies find that white individuals are more likely to exchange financial assistance with family members, though much research in this vein is limited to the parent-child dyad (Jayakody 1998; Lee and A. 1998). By contrast, black individuals appear more likely than their white counterparts to give and receive emotional support and childcare and to do care work generally (Sarkisian and Gerstel 2004). Notably, several studies document the regularity with which black individuals incorporate extended kin into such exchange patterns (Johnson and Barer 1995; Raley 1995).

Costs of Kin Imprisonment

These findings suggest that black families are often organized in ways that would exacerbate the spillover effects of kin imprisonment. What, though, are these consequences and are they felt by extended kin? Most attention has been paid to the effects on prisoners' immediate family members: children (Murray and Farrington 2008; Wakefield and Wildeman 2014), partners (Wildeman, Schnittker, and Turney 2012), and mothers(Braman 2004; Turney 2014).[3] Little quantitative research has examined the effects of kin imprisonment beyond these close ties.[4] This is, to some extent, unsurprising: the major data sources leveraged in this field—the Fragile Families and Child Well-Being

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[3] A number of reviews provide insightful summaries of the literature on collateral consequences of imprisonment for families. See Comfort (2007); Kirk and Wakefield (2018); Wakefield, Lee, and Wildeman (2016); Wakefield and Uggen (2010); Wildeman and Muller (2012).

[4] Lee et al. (2014) represents an exception; Braman (2004) provides a standout example of qualitative work on consequences beyond the immediate family.

Study and the National Longitudinal Study of Adolescent Health—do not include sufficient information on networks and imprisonment of distal relatives to support analysis. There is, however, reason to believe that imprisonment *does* affect extended kin in at least two ways: by imposing costs on families and by reducing current- and former-prisoners' contributions to kin support.

Many of the costs of imprisonment are either borne directly by or indirectly affect non-immediate family members. These start with the significant expenses of maintaining contact with and materially supporting an imprisoned family member (DeVuono-Powell et al. 2015). Family members regularly pay for childcare or directly house and care for the children of prisoners (Green et al. 2006). The material hardship and stress of kin imprisonment results in a range of health problems (Lee et al. 2014), while stigma leads family members to withdraw from social relationships, reducing their access to interpersonal support and exacerbating depressive symptoms (Braman 2004).

Costs extend beyond the period of imprisonment. Most prison inmates hold legal financial obligations that result from their conviction (Harris et al. 2010). The majority of formerly-imprisoned individuals report that family members—including extended kin—are their primary support in paying off these debts (Nagrecha, Katzenstein, and Davis 2015). Former prisoners are also heavily reliant on family members for other financial assistance, housing, emotional support, food, and transportation (Harding et al. 2014).

Kin networks also suffer due to long-term reductions in prisoners' ability to support themselves and others. Former prisoners have worse employment options and outcomes than their never-imprisoned peers (Uggen, Manza, and Thompson 2006), and suffer a range of long-term health problems (Massoglia 2008), which further inhibit their prospects and represent an additional strain on family members. Furthermore, imprisonment lowers net worth and the odds of wealth accumulation (Turney and Schneider 2016), and many ex-prisoners are permanently ineligible for a range of social welfare benefits (DeVuono-Powell et al. 2015). As a result, former prisoners contribute less financially to their children (Geller, Garfinkel, and Western 2011) and the immediate families of prisoners face higher levels of material hardship (Schwartz-Soicher, Geller, and Garfinkel 2011).

This suggests that (1) family members face considerable financial and emotional costs due to kin imprisonment and (2) that currently- and previously-imprisoned individuals will be less able to reciprocate the support they receive from kin. Thus, former prisoners represent a unique sort of negative social capital: a node in one's kin network that offers little social support (and no social leverage) (de Souza Briggs 1998), but that regularly makes demands (O'brien 2012). The compounding effects of these two factors may lead to the fraying of family ties. Braman (2004) describes how the stigma of imprisonment and the breakdown of reciprocal exchange lead kin to withdraw from one another. As he puts it, “the relationships and norms described as social capital have increasingly become burdens rather than benefits to many inner-city families” (p.7). The breakdown of kin networks due to these processes represents an additional—perhaps even more severe—cost of kin imprisonment.

Imprisonment Risk and Connectedness to Prisoners

Given the ways in which the burdens of imprisonment can diffuse into broader family networks and persist for years, it is important to assess how exposure to kin imprisonment is structured across the population and over the course of affected individuals’ lives. Previous research has detailed variations, by cohort, race, and education, in the cumulative risk of own and paternal imprisonment (Pettit and Western 2004; Wildeman 2009). These studies employ formal demographic methods to convert period measures of current imprisonment into cohort measures of cumulative risk. What they do not provide—and indeed cannot provide given limitations in the data upon which they rely—is insight into how the prison boom has affected the exposure to imprisonment within *extended* family networks.

The connectedness literature offers several examples of research aiming beyond the nuclear family. Lee et al. (2015) use the 2006 General Social Survey to estimate the probability of having a currently imprisoned family member (of any relation). Wildeman and Wakefield (2014) use data from the Project on Human Development in Chicago Neighborhoods to analyze the concentration of imprisonment within family networks, demonstrating that children of incarcerated parents are more likely to have other relatives simultaneously incarcerated. Both studies offer new insight into imprisonment within family networks, but the data used in both cases lead to notable limitations: neither study allows for any conclusions about changing rates of connectedness over time nor for identification of the *previously* imprisoned within family networks. Also, reliance on respondent recall of imprisonment and family network composition presents the risk of error due to selection and imperfect recollection. This concern is amplified by recent findings of underreporting of familial imprisonment and racial variations therein (Geller, Jaeger, and Pace 2016; Sykes and Pettit 2014).

In what follows, I describe a demographic microsimulation strategy that allows for the estimation of kin imprisonment over both historic and individual time, and for a much wider set of kin relations than is feasible to produce using any existing observational data.

Methods

This chapter provides estimates of imprisonment within extended kinship networks of black and white Americans over the course of the prison boom of the 1980s and 1990s. I consider the *extended* kinship network, which includes not only nuclear kin, but all living relatives descended from a common grandparent (including grandparents, grandchildren, aunts, uncles, cousins, nieces, and nephews). To enable measurement of this expanded scope, I rely on data generated by a microsimulation technique (as in the previous chapter) that takes observed rate schedules in population fertility, mortality, and imprisonment as inputs and returns complete estimates of genealogical relatedness for all simulated individuals over their entire lifespans. In the sections that follow I describe this simulation model, the data and assumptions upon which it is based, and the specific questions that I seek to answer with it.

Data Limitations and Microsimulation

While the Surveys of Inmates in State and Federal Correctional Facilities (SISFCF) offer the possibility of addressing any number of important questions, their utility is limited when it comes to analyzing broader kin relations, kin availability over the life course, and certain population-level exposure rates. These surveys include information on prisoners' close kin relations (e.g. parents, children, sibling, and significant others), but do not collect data on extended kin relations like grandparents, grandchildren, uncles/aunts, and cousins. The data that are collected on close kin are also time-invariant, which forecloses analyses of changing kin composition over the life course. I am, at the time of this writing, unaware of any survey data that would allow me to directly measure the connectedness of prisoners to their extended kinship networks over the life course.

To overcome these data limitations, I employ a microsimulation framework to characterize the lifetime trajectories of kinship and imprisonment of non-Hispanic black and white U.S. populations over the course of the prison boom.[5]

In practice, I achieve this by utilizing SOCSIM[6] to simulate fictive groups of individuals calibrated to match the demographic behavior of black and white populations born between 1960 and 2010. Within SOCSIM, these simulated individuals "live" out their digital lives, partnering, creating offspring, becoming imprisoned, and dying within the parameters set by externally-imposed rate schedules. At the conclusion of each

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[5] I choose to look at non-Hispanic populations primarily due to inconsistent reporting of ethnicity over the period of interest.

[6] Additional information on SOCSIM may be found in Hammel and Wachter (1976), Wachter, Blackwell, and Hammel (1997), and online at http://lab.demog.berkeley.edu/socsim

simulation, SOCSIM returns a complete dataset with the full demographic characteristics of each individual, including all the genealogical variables necessary to reconstruct that individual's entire kinship network (including the imprisonment status of the kin that make up those networks).

To facilitate comparisons between black and white experiences, I run two separate simulations—once with demographic and imprisonment rates for whites and a second time with the corresponding rates for blacks. Other than the different rate inputs, the two simulations are exactly identical in specification. To reduce variation due to the randomness of any single simulation, I run each race-specific simulation 25 times and average measurements, weighted by population size, across all runs.[7]

The Microsimulation Model

I configure the race-specific simulation models with four sets of data inputs: (1) age-specific fertility rates; (2) age- and sex-specific mortality rates; (3) age- and sex-specific prison admission rates; and (4) age- and sex-specific prison release rates. Fertility and mortality rate inputs for the period 1960-2010 are derived from the U.S. National Vital Statistics System's (NVSS) central fertility rate tables (Heuser 1976) and life tables (Arias 2014; Hamilton and Cosgrove 2010, 2012), respectively. Prison admission and release rate inputs over this same period, on the other hand, are more difficult to assign due to less consistent reporting of this information.

The Bureau of Justice Statistics (BJS) provides race-stratified annual counts of prison admissions for the years 1960, 1964, 1970, and then every year from 1974 to 2014 (Langan 1991; United States Bureau of Justice Statistics 2016b, 2016a); and annual counts of prison releases for every year from 1978 to 2014 (Carson and Golinelli 2013; United States Bureau of Justice Statistics 2016b, 2016a). Because these counts are reported at uneven intervals, I must choose a method by which I can "fill in" data for the gap years. Ultimately, I settle on linear interpolation as a reasonably conservative solution. Additionally, unlike the fertility and mortality information derived from the NVSS, counts of prison admissions and releases are not always reported separately by race, sex, and age. Because the SOCSIM models require inputs in this stratified form, I must choose a method by which I can distribute the counts of admissions and releases along the different race-, sex-, and age- strata in the simulation model. The strategy I adopt, again, is to linearly interpolate the race-, sex-, and age- distributions for gap years and apply these interpolated proportions when assigning counts to each of the unknown race-, sex-,

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[7] Averaging results across 25 replicate simulations effectively reduces the stochastic error of my estimates to zero.

and age- strata.[8] These admissions and release counts that have been thus harmonized with respect to their distribution across simulation years and across the different race, sex, and age strata, form the numerators for the raw SOCSIM admission and release rate inputs. For the denominators, I rely on the U.S. Census Bureau's historical and intercensal estimates of national population counts (U.S. Census Bureau 2015), and the BJS's and University of Albany Sourcebook of Prison Statistics' national prison population counts (Carson and Sabol 2014; Langan 1991; University at Albany 2012) for calculating the admissions and release rates, respectively.

For the period extending beyond 2014, I simply hold the simulation rates fixed at the latest specified values (i.e. 2010 for fertility and mortality, and 2014 for prison admission and release). For the supplementary analysis of future imprisonment rate trajectories (described below), I run three additional simulations that each modify the 2015 prison admission rates to simulate three potential futures: (1) a dramatic, 75% reduction in imprisonment; (2) a moderate, 25% reduction in imprisonment; and (3) no change in imprisonment.

Finally, to ensure that the simulations reliably reproduce observed population trends in each of the input domains, I employ a rigorous calibration procedure that multiplicatively scales each of the input rate parameters over each decade of simulation until the likelihood of reproducing known population-level measures in those variables (i.e. total fertility rate, life expectancy at birth, and rate of first admission to prison) is maximized in the data.[9] Then, as a final check of the fully-calibrated simulation model's ability to return plausible results, I compare measures of own and family imprisonment reported by three previous studies (Lee et al. 2015; Western and Wildeman 2009; Wildeman 2009) with those generated by the models. In brief, I find close agreement (within 3 percentage points) between my model estimates of own and parental imprisonment risk with those reported by Western and Wildeman (2009) and Wildeman (2009). Similarly, I find reasonably close agreement between my estimates of current family imprisonment prevalence and those reported by Lee et al. (2015).[10] The ability of the simulation model to largely replicate the results of these previous studies suggests that my methodological approach is, at least, no worse than the current standard.

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[8] Online appendix table A1-2 provides a summary of how these interpolated year-specific distributions of age, race, and sex are assigned to each simulated year of admission and release count data.

[9] What is thus assumed by the calibration method is confidence in the general shapes of the age-specific mortality, fertility, prison admission, and prison release curves that I input, but uncertainty regarding their exact magnitudes. A more technical treatment of the procedure is provided in Appendix A2.

[10] Full details of this validation exercise, including complete comparison tables, is provided in Appendix A3.

Outcomes of Interest

Using the data from my simulation models, I calculate age-specific estimates of *kin imprisonment*: both the *incidence* and *prevalence*, within kinship networks, of relatives who have *ever* been imprisoned. For my purposes, I define "kin" to include all relatives descended from at least one common grandparent: grandparents (on both father's and mother's side), parents, aunts/uncles (on both father's and mother's side), siblings, and cousins (on both father's and mother's side). I define "incidence" of kin imprisonment to be the probability that a living relative is imprisoned (for the first time) over a particular year of ego's life; and I define "prevalence" of kin imprisonment to be the proportion of living relatives who have ever been imprisoned by a particular year of ego's life. For my measures of incidence, I count only those kin who are imprisoned after the birth of ego in order to capture the disruption that the imprisonment of those family members is liable to entail for the average individual living through the event. On the other hand, for measures of prevalence, I count even those kin who were imprisoned before the birth of the focal ego in order to capture the lasting disruption that the imprisonment of those family members may represent for the family network at large.

Finally, I choose to focus on those ever imprisoned—rather than only those currently imprisoned—because the stigma and material costs of the "prison label" do not end with re-entry, but often persist for the rest of former prisoners' lives. I recognize the important role of recidivism in concentrating imprisonment risk and prevalence within particularly vulnerable communities. Recent evidence, for instance, suggests that the vast majority of those who go to prison are likely to be re-arrested within five years of release (Durose, Cooper, and Snyder 2014). Unfortunately, available data on prison re-admission rates are too sparse for me to use to accurately model recidivism in the simulation. Thus, for the purposes of this chapter, I have elected to remain agnostic about re-admission patterns (assuming, in effect, that re-admission risk is distributed uniformly across the population regardless of past imprisonment history). Accordingly, my analyses and conclusions do not speak directly to outcomes where recidivism patterns are of critical importance (such as *current* imprisonment status). However, not explicitly modeling recidivism in the simulation means I risk over-estimating the true prevalence of kin imprisonment (via inflation of prison admission rates due to high re-arrest). In order to mitigate this effect, I (1) use data on *first* admissions whenever possible and (2) calibrate the simulation model such that it reliably re-produces expected rates of first admission (which necessarily discounts re-admissions) at the population level (see Appendix A2).

My focus on the family centers on its capacity to be a source of both support and strain for its members. In this vein, I pay particular attention to two vulnerable life course periods. First, I examine the incidence and prevalence of imprisonment of same- and older-generation kin during childhood. Second, I describe the incidence and prevalence of imprisonment of younger-generation kin during the post-retirement years. In both cases I pay special attention to kin who are in their prime working ages (25-54 years-old) and thus likely to be an important source of material support for family members.

Because of the historically exceptional nature of mass imprisonment and the stark racial disparities of its reach, I produce estimates of kin imprisonment separately for black and white Americans across two birth cohorts: those born in the period 1960-1970 and those born in the period 1985-1995. These cohorts, spaced 25 years apart, are chosen to represent those most directly impacted by the start of the prison boom—those reaching adulthood as mass imprisonment began to ramp up in the '80s and the '90s (the *"boom" generation*)—and those who would become the second generation living under the peak of that carceral movement (the *"post boom" generation*).

In 2015, those born in 1960 and 1985 turned 54 and 29, respectively. In order to provide some sense of how the *lifetime* experiences of kin imprisonment are likely to differ across generations, I draw out my plots to age 80 for both birth cohorts assuming that the latest known demographic rate schedules hold constant for unobserved future years.[11] As a supplementary analysis, I examine three possible future trajectories of imprisonment in the United States: (1) imprisonment rates drop 75% by 2035 (roughly, to pre-1980, or pre-"prison boom", levels); (2) they drop 25% by 2035; (3) they hold steady at the latest known levels.

The first of these scenarios represents a future wherein political initiatives to reduce incarceration in the United States (e.g. the "Cut 50" campaign organized by the Dream Corps; for additional details see https://www.cut50.org/) are successful, the second where such efforts are partially successful, and the third where the national trend in imprisonment does not change. To characterize the family network consequences of each of these potential futures, I measure the prevalence of kin imprisonment for the 1985-1995 "post-boom" cohort.

Finally, I conduct an exploratory analysis of variation in these estimates by educational attainment (see Appendix A4). Education, understood as a proxy for class, has been central to previous analyses of prison and the life course (Western and Wildeman 2009). Those with less education consistently face higher risk of imprisonment. Given correlations in educational attainment within families (Ermisch and Pronzato 2010),

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[11] Consequently, while the reliability of my kinship estimates for the 1960-1970 cohort is likely to be reasonably good across most ages, estimates for the later ages of the 1985-1995 cohort are subject to the uncertainties inherent in projection.

some kin networks likely face considerably smaller or larger risk and prevalence of kin imprisonment.

Results

The Risk of Kin Imprisonment

To characterize the likelihood that an individual experiences the imprisonment of different types of kin over the course of her life, I plot age-specific probabilities of first imprisonment[12] of these kin (contingent on ego surviving to each age[13]). To examine how these patterns differ by race and cohort, I draw separate plots for the black and white populations, and for the "boom" (1960-1970) and "post-boom" (1985-1995) cohorts (Figure 1).

There are three aspects of Figure 1 that I wish to highlight. First, there are clear differences of magnitude in the black and white experiences of kin imprisonment. Averaging across all ages, in both cohorts a black individual faces well over three times higher risk of first kin imprisonment per year than a white individual. At the age of widest racial divergence (age 49 for the "boom" cohort and age 6 for the "post-boom" cohort), the average white individual faces a kin imprisonment risk of about 1 imprisonment per every 100 relatives, while the average black individual faces a risk of about 1 imprisonment per every 10 relatives.

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[12] By "first imprisonment" I simply mean the first time a unique member of ego's kinship network is imprisoned. This represents the transition from never to ever imprisoned status.

[13] If kin imprisonment events occur prior to the birth or following the death of an individual, those kin imprisonment events are not observed for that individual and thus not counted as part of the numerator. Kin imprisonment that occurs before ego's birth does factor into the prevalence calculations in the subsequent sections.

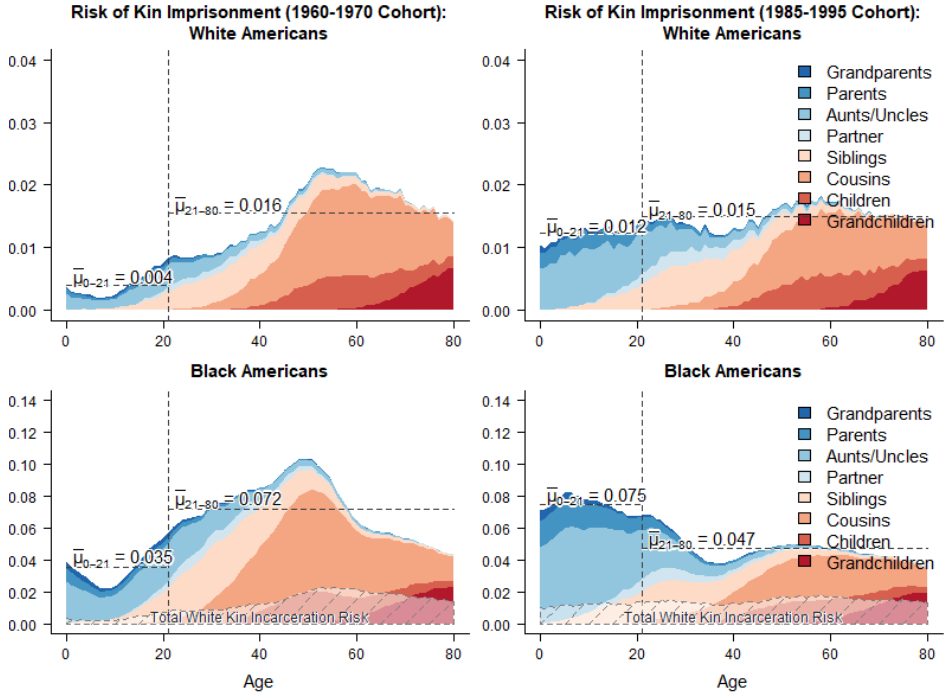

Figure 1. Cohort-specific probabilities of first kin incarceration over age (by relation). The top plots illustrate the contributions of each kin relation to the overall risk profile for white individuals; the bottom plots illustrate the same for black individuals. Horizontal dashed lines indicate mean overall risk before and after age 21 (which is indicated with the vertical dashed line). The total risk density of the white population is superimposed on the bottom (black population) plots to aid comparison across the two different y axis scales.

Second, the proportional distribution of kin-specific risk varies by cohort but relatively little by race. Figure 1 disaggregates each cohort- and race-specific risk curve into its kin-specific components. Within cohorts, we see that though the magnitudes of risk differ quite dramatically between the black and white populations, the relative risks contributed by each kin relation are similar. We see that the relative contribution of older generations (grandparents, parents, and aunts/uncles) to the overall kin imprisonment risk increases over cohorts, while the relative contribution of same- or younger-generation kin (partners, siblings, cousins, children, and grandchildren) decreases. This shift reflects two demographic trends: (a) declining birth rates, which reduces the number of siblings and cousins subject to the risk of imprisonment; and (b) declining mortality rates at older ages, which increases the number of grandparents, parents, and aunts/uncles subject to the risk of imprisonment. For the white population, this translates to a 15.7% reduction in the contribution by same-or-younger generation kin and a corresponding increase in the contribution by older-generation kin to the lifetime risk of kin imprisonment. For the black population, the change in contribution by kin generation is 19.2%.

Third, there is a difference in the timing of first kin imprisonment between the two cohorts. The "boom" cohort tends to experience the first imprisonment of kin later in life than the "post-boom" cohort. This conforms to expectations given that the mass imprisonment movement reached its peak in the '80s and the '90s when the "boom" cohort was just reaching adulthood and the "post boom" cohort were just beginning to be born. The average black and white individuals in the "boom" cohort experience their first kin imprisonment events at ages 17 and 54, respectively. Their counterparts in the "post-boom" cohort experience this event at ages 7 and 39, respectively. Especially for the black population, this represents a qualitative change in the expected life course; first kin imprisonment is expected to occur during the earliest years of primary school rather than in the years immediately preceding adulthood.

The second and third points highlight the importance of looking at full kin networks. If I were to constrain my focus to just immediate family members—parents, partners, and children—the mean age of experiencing imprisonment of kin for the first time would be 52 for blacks in the "boom" cohort and 37 for blacks in the "post-boom" cohort.[14] This is 30-35 years later than the estimates that I provide above. Taking seriously the claim that the imprisonment of family members represents a disruption to normative life course

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[14] The mean age of first kin imprisonment for whites for this reduced set of kin relations (i.e. the age at which the cumulative sum of annual risk tips past 50%) shoots off the charts well into the post-centenarian years.

expectations, these earlier observed ages of first kin imprisonment are likely to herald important developmental consequences for families and their most vulnerable members.

The Prevalence of Kin Imprisonment

Imprisonment signals a state change, not just a momentary disruption. To characterize the prevalence of prisoners and ex-prisoners in the kinship networks of black and white individuals, I plot the proportion of living relatives who have ever been imprisoned at each age of ego (Figure 2).

The age-specific prevalence of imprisonment within kinship networks is generally similar across races: a steady increase over ages.[15] However, the increasing magnitude of difference between the prevalence of imprisoned members in black kinship networks versus white kinship networks is striking. Within the 1960-1970 cohort, 4.2% of living black relatives have ever been imprisoned by the time ego reaches age 21, while a roughly similar percentage (2.3%) of white relatives have ever been imprisoned by the same age. Within the 1985-1995 cohort, however, the race difference intensifies: by age 21, 9.4% of black relatives have ever been imprisoned, while 2.0% of white relatives have ever been imprisoned. At age 65, 15.2% of black relatives and 3.6% of white relatives in the earlier "boom" cohort have ever been imprisoned; the equivalent figures are 15.3% and 5.2% in the "post-boom" cohort.

While the prevalence of current and former imprisonment within full kinship networks provides useful information regarding the opportunities (or lack thereof) for support in those networks, the large variation in the ages of relatives potentially confounds the true capacity of the kin network to provide that support. We get better purchase on this issue if we examine the prevalence of imprisonment among kin who are of prime working age (Figure 3).

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[15] In the case of white Americans born 1960-1970, the prevalence remains largely stable until about age 50 when it begins its upward movement.

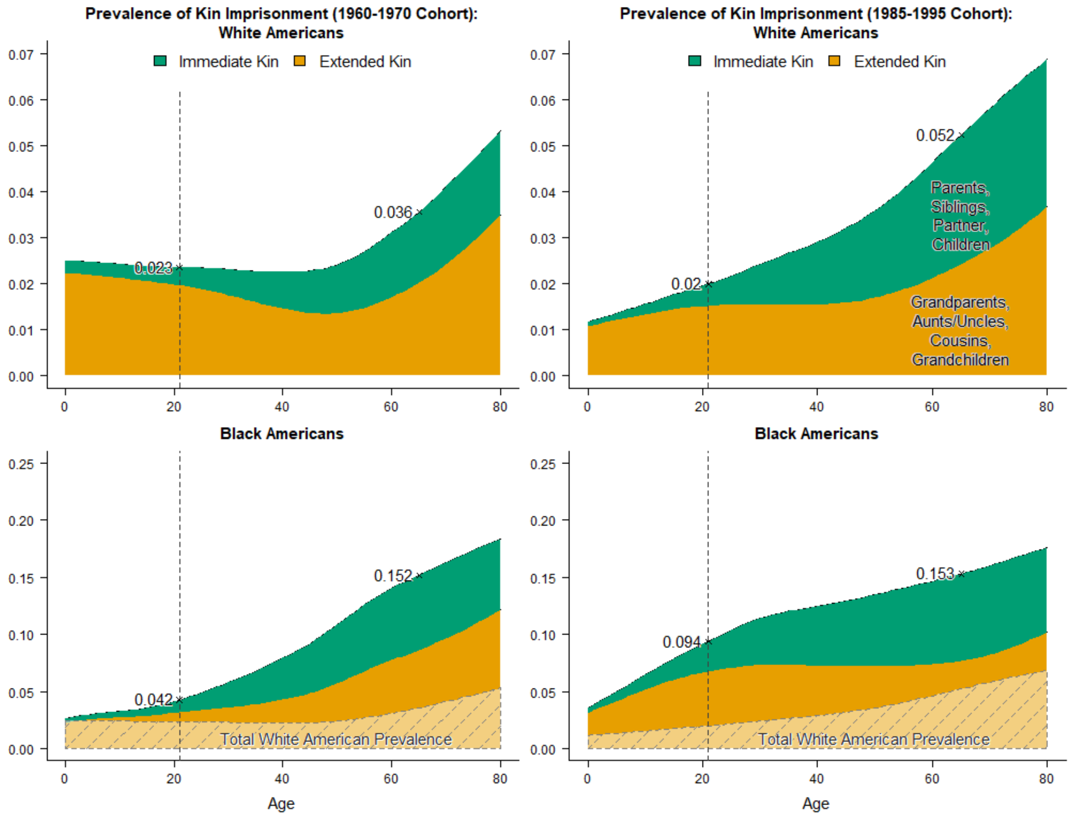

Figure 2. Cohort-specific prevalence of incarceration within kinship networks over age (by relation). The top plots illustrate the proportion of living kin who have ever been incarcerated for white individuals, whereas the bottom plots illustrate the same for black individuals. Points marked by x's indicate the proportion of kin ever incarcerated when ego is age 21 and 65. The total prevalence of incarcerated kin in the white population is superimposed on the bottom (black population) plots to aid comparison across the two different y axis scales.

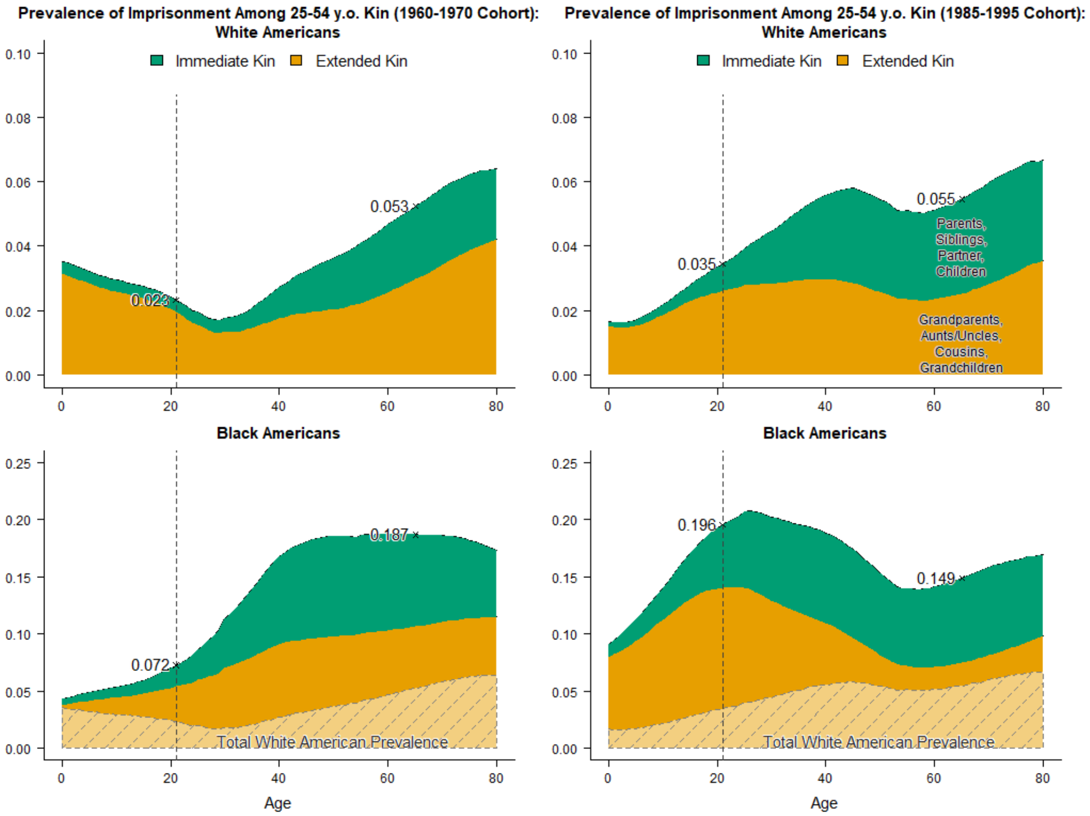

Figure 3. Cohort-specific prevalence of incarceration within kinship networks over age (by relation) among kin who are of working age (25–54 years old). The top plots illustrate the proportion of living kin who have ever been incarcerated for white individuals, whereas the bottom plots illustrate the same for black individuals. Points marked by x's indicate the proportion of kin ever incarcerated when ego is age 21 and 65. The total prevalence of incarcerated kin in the white population is superimposed on the bottom (black population) plots to aid comparison across the two different y axis scales.

When we look exclusively at those relatives of working age (versus all relatives), we see that the proportion ever imprisoned increases at earlier ages. For example, in the "boom" cohort 11.1% of black working-age relatives have ever been imprisoned by the time ego reaches age 21, compared to 4.2% of *all* relatives.

Table 1 summarizes the findings on the prevalence of kin imprisonment, splitting by cohort, race, and kin type (all kin and working-age kin).

Table 1. Prevalence (in percents) of kin imprisonment by age, race, and type of kin for two cohorts.

1960-1970 Cohort

		0	**5**	**10**	**21**	**65**	**75**
White	all kin	2.5%	2.5%	2.4%	2.3%	3.6%	**4.7%**
	working-age kin	3.5%	3.2%	3.0%	2.3%	5.3%	**6.3%**
Black	all kin	2.5%	3.0%	3.2%	4.2%	15.2%	**17.4%**
	working-age kin	4.3%	4.9%	5.3%	11.1%	15.9%	**15.2%**

1985-1995 Cohort

		0	**5**	**10**	**21**	**65**	**75**
White	all kin	1.2%	1.3%	1.5%	2.0%	5.2%	**6.4%**
	working-age kin	1.6%	1.7%	2.2%	3.5%	5.5%	**6.4%**
Black	all kin	3.6%	5.0%	6.5%	9.4%	15.3%	**16.8%**
	working-age kin	9.1%	11.2%	14.0%	19.6%	14.9%	**16.5%**

Finally, in Figure 4, I re-situate the information presented in Figure 3 within the context of full kinship networks. This allows me to illustrate the total "availability" of kin who are hypothetically least-constrained in their ability to provide material support for their relatives: those of working age who do not have a prison record.

The proportions of all kin who are of working-age and who have ever been imprisoned are substantially higher in black kinship networks. If all imprisonment histories were eliminated from all kinship networks, black individuals in the "boom" and "post-boom" cohorts would stand to gain 16.7% and 19.2%, respectively, in the lifetime prevalence of working-age kin without a prison record. In comparison, the average white individual would stand to gain 4.0% and 4.8%, respectively. When I translate these proportions into kin-years "lost" to imprisonment, the comparison becomes much more tangible: over the course of life, black individuals in the "boom" and "post-boom" cohorts lose 90.1 and 83.3 person-years. White individuals lose 20.4 and 19.1 person-years, respectively.

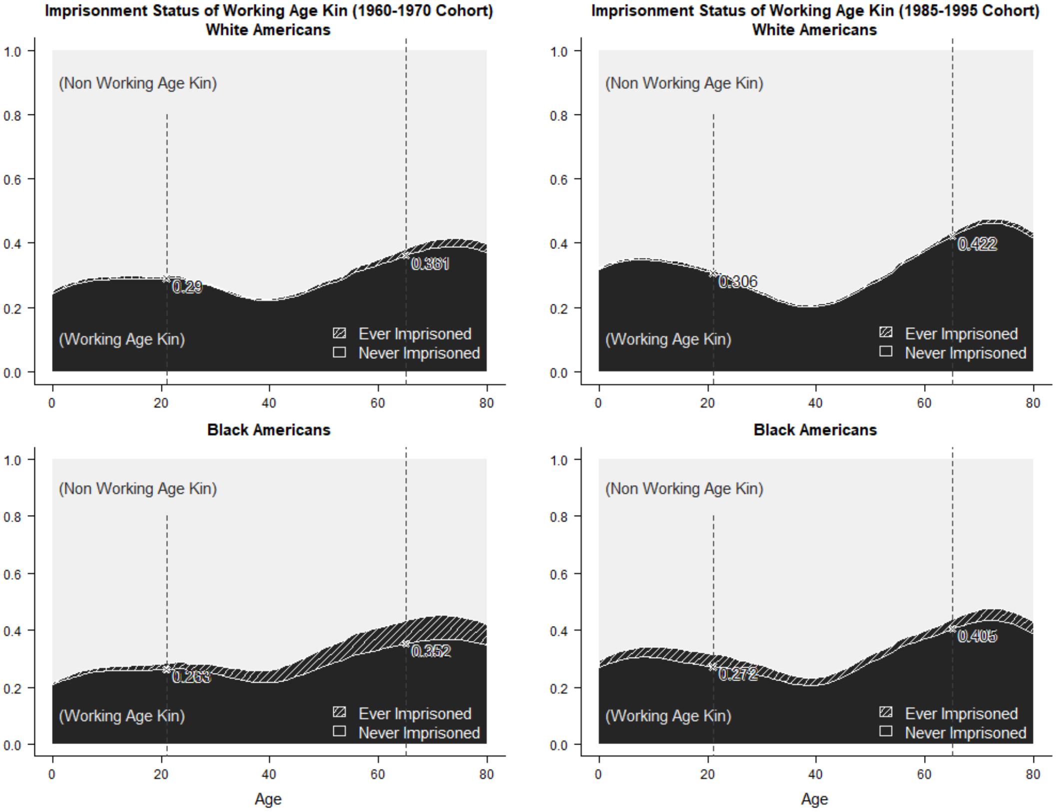

Figure 4. Cohort-specific availability of never-incarcerated, working age (25–54 years old) kin. The top plots illustrate the proportions of working-age kin for white individuals, whereas the bottom plots illustrate the same for black individuals. The shaded regions indicate the share of working-age kin who have ever been incarcerated. Points marked by x's indicate the proportion of kin who are working age and have never been incarcerated when ego is age 21 and 65.

I want to highlight two major findings here. First, for both the black and white populations, a greater proportion of the total kin imprisonment prevalence is due to the imprisonment of extended kin rather than immediate kin. Over the course of life, more than half of all currently and formerly imprisoned relatives in both black and white kinship networks are relatives of the sort that are typically un-examined in studies of the collateral consequences of imprisonment. Second, imprisonment reduces the lifetime availability of never-imprisoned working-age kin for blacks much more dramatically than it does for whites. Furthermore, this "deflation" comes at the heavy cost of increased prevalence of imprisonment among black working-age relatives, converting potential fonts of kin support into sources of kin strain.

Future Trajectories of Kin Imprisonment

In order to assess the consequences of different possible trajectories of imprisonment in the United States, I plot the prevalence of kin imprisonment for the "post-boom" (1985-1995) cohort under three scenarios: (1) no change in prison admission rates; (2) a linear 25% reduction in prison admission rates by the year 2035; and (3) a linear 75% reduction in prison admission rates by the year 2035. Because these future scenarios start in the year 2015, I start plotting at age 20—when the youngest members of the "post-boom" cohort enter the year 2015.

As expected, we see that the greater the reduction in future rates of prison admission, the lower the lifetime prevalence of ever imprisoned kin within family networks. This holds true for both black and white simulated populations. Overall, a 25% reduction in prison admission rates by the year 2035 leads to a 16-23% reduction in the proportion of family members ever incarcerated by age 65; and a 75% reduction in prison admission rates leads to a 35-44% reduction in the proportion of family members ever incarcerated by that same age. Though the relative drop in the proportion ever incarcerated is roughly similar across race groups, the absolute drop in these numbers is much more dramatic for blacks than for whites: 15% of black family members are expected to have ever been imprisoned by the time ego reaches retirement age under the "No Change" scenario versus 10% under the "75% Reduction" scenario. For the white population, the equivalent drop in kin imprisonment prevalence is from 5% to 3%. The net result of these reductions is a meaningful narrowing of the race disparity in lifetime kin imprisonment prevalence from around 10% to 7%. That said, it is remarkable that even a 75% reduction in future imprisonment rates for the black population would still not be enough to bring them to parity with a white population whose imprisonment rates did not change at all.

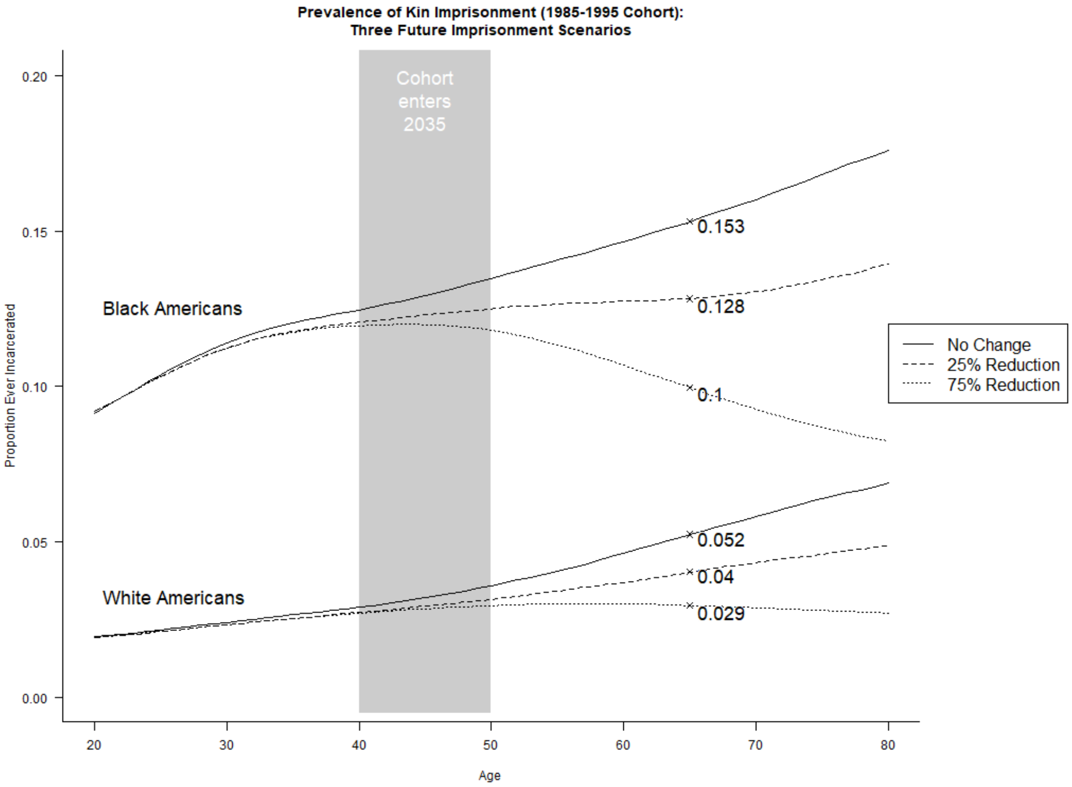

Figure 5. Prevalence of imprisonment within kinship networks over age for the 1985–1995 cohort under three future imprisonment rate scenarios (stratified by race). Dashed and dotted lines are results from simulations in which future imprisonment rates are reduced 25 percent and 75 percent, respectively, by the year 2035. Points marked by x's indicate the proportion of kin ever imprisoned when ego is age 65.

Two additional features of these results are worth addressing. First, the "25% Reduction" scenario sees a net reduction in kin imprisonment prevalence over all ages (compared to the "No Change" scenario), but the prevalence of kin imprisonment still increases monotonically over ages such that the older one gets, the more of one's living relatives are likely to have ever been imprisoned. Under the "75% Reduction" scenario, however, the age trend in kin imprisonment hits an inflection point and begins to decline in mid-to-late adulthood. In other words, there appears to be a particular imprisonment rate threshold beyond which the life course experience of kin imprisonment takes on a qualitatively different character: one eventually reaches a point in life when the older one gets, the *fewer* of one's living relatives are likely to have ever been imprisoned.

The second point worth noting is that future reductions in the rate of imprisonment are likely to have a delayed impact on the families of those whose lives have already been touched by the prison boom. For the post-boom (1985-1995) cohort, for example, even a dramatic 75% drop in prison rates over a relatively brief 20-year period does not visibly affect the prevalence of kin imprisonment until around middle adulthood. By this time, most individuals will have already completed school, started a career, and have finished having children. Thus, much of the potential gains to familial support are muted for these individuals. Instead, those who stand to gain the most from a reduction in future imprisonment rates are the next generations of Americans for whom the prison boom would then be an object of historical, rather than personal, memory.

Discussion

The prison boom of the 1980s and the 1990s has left an indelible mark on the American family. As I have shown, both the likelihood of experiencing the imprisonment of a relative as well as the overall exposure to relatives marked by the prison label has expanded tremendously over time. Furthermore, this expansion has overwhelmingly affected black families.

Research on the collateral consequences of imprisonment has characterized the effects that serving time has on the wider networks of family and friends within which prisoners are embedded. The focal egos in these investigations are typically prisoners' children, partners, and parents. One of the key findings of this study is that these immediate kin members make up a minority of imprisoned or formerly-imprisoned kin. Across race and cohorts, more than half of all imprisoned or formerly-imprisoned relatives are extended kin.

As I argued above, the imprisonment of extended kin matters because (1) extended family members bear some portion of the material and symbolic costs of kin imprisonment and (2) former prisoners are less able to contribute to future kin support. These two factors can interact in ways that undermine norms of reciprocity and trust and ultimately weaken kin networks. These networks have been shown to be particularly important for black families.

I find that those born at the height of the prison boom (1985-1995) are at higher risk of experiencing the first imprisonment event of a same- or older- generation relative during childhood and adolescence than those born 25 years prior. This translates into experiences of kin imprisonment at much earlier ages (up to 15 years earlier) and higher lifetime prevalences of ever imprisoned relatives within kinship networks when comparing across birth cohorts. These trends signal an alarming growth in the collateral consequences falling on the American family due to the growing carceral state over the past several decades.

Within cohorts, race differences in the experience of kin imprisonment are the most compelling story. White Americans alive at the height of the prison boom are likely to have had very few occasions to deal with the strain, stigma, or trauma of imprisonment.

Black Americans over the same period, by contrast, were substantially more likely to have to shoulder that burden for either themselves or their kin, often during their most vulnerable ages. Black individuals (relative to white individuals) are at substantially higher risk of experiencing the first imprisonment event of a relative at every age, are likely to experience that event at much earlier ages, and have proportionately more relatives who have ever been imprisoned. At age 6, the moment of widest racial disparity in kin imprisonment risk for the 1985-1995 cohort, the average black individual loses 1 of every 10 relatives to imprisonment, while the average white individual loses 1 of every 100.

By age 21, 9.4% of black relatives have acquired a prison record versus 2.0% of white relatives. This represents a nearly five-fold higher probability of black individuals having currently or formerly imprisoned relatives within their kinship networks at the moment they first enter their adult years. By age 65, the normative age of retirement, the race difference is even wider: 15.3% of black relatives versus 5.2% of white relatives with a prison record. Over the course of life, this translates to 83.3 person-years of potential support from working-age relatives lost to imprisonment for black Americans, and 19.1 person-years lost for white Americans. By all these measures, the collateral consequences of the growing carceral state appear to be disproportionately borne by black families.

But what about the future? With increasing agreement among researchers, activists, and policymakers that the current carceral system is in need of reform, we are likely to see efforts to reduce the national rate of imprisonment. The results of my analysis suggest that the consequences of such efforts are likely to be profound (especially for black families), but also delayed. For those who lived through the prison boom, the "damage," in some sense, has already been done. The prevalence of imprisonment within their families will not see much change even if dramatic cuts to imprisonment rates are implemented quite soon.

However, this does not indicate that efforts to reduce imprisonment are wasted. On the contrary, the importance of such initiatives to the future family lives of our most recent generations is likely to be quite pronounced. What is more, my analysis suggests that there may a clear benefit to reducing national imprisonment rates as much as possible: below some threshold imprisonment rate, the age trend in the prevalence of imprisonment within kinship networks stops increasing monotonically and instead takes on an inverted-U shape. The implications of such a qualitative shift, from a life course perspective, are enormous. By achieving an imprisonment rate low enough to trigger a mid-life decline in familial imprisonment burden, I would enable Americans, for the first time in several decades, to see the reach of the carceral state into their families recede rather than increase over their own lifetimes.

Future Directions

In this chapter I estimate, in broad strokes, how mass imprisonment differentially affects the composition of black and white kin networks. This is in many ways a preliminary analysis. I suggest three major avenues for future research building on these findings.

First, given adequate data, the simulations carried out here could be extended in a number of ways. In Appendix A4 I provide a first example of how this might be done by incorporating known variations by education in lifetime risk of imprisonment (Pettit and Western 2004). Given race-specific measures of assortative mating, cross-generational educational transmission, and repeated cross-sections of family educational composition, those estimates could be substantially improved. Wildeman and Wakefield's (2014) recent work suggests that the concentration of imprisonment within families also bears further investigation. My simulations do not—but with sufficient data potentially could—account for any intergenerational transmission or clustering of imprisonment risk within family networks. Full simulations are plausible but require increasingly sophisticated procedures to ensure the reliability and accuracy of simulated estimates. Confirmation of resulting estimates would also likely require collection of new sorts of network data.

Second, results from these simulations should lead to reassessment of previous findings on the collateral consequences of imprisonment. I agree wholeheartedly with Wildeman and Wakefield in their assessment that, "the massive literature considering the effects of parental imprisonment on children may have been picking up not solely a direct effect of parental imprisonment, but a combined effect of parental imprisonment and broader family member imprisonment" (Wildeman & Wakefield 2014:389). Much the same could be said about research on the effects of imprisonment on romantic partners and mothers of prisoners. If others in the ego's kin network are also imprisoned and straining either ego's or the network's resources, then the direct effect of proximate kin's imprisonment may be over-estimated.

Finally, third, I believe there is more to be gleaned from analyzing the extended family as a meso-level institution. For example, the results presented here have implications for reintegration of former prisoners. Families are the primary social institutions to which the formerly-imprisoned return (Harding et al. 2014). This study draws attention to the changing composition of these families across race and over time. Different types of kin networks may be more or less supportive of the reintegration process. Does having higher proportions of relatives in their prime working ages mean that more material support is available to re-entrants? Is this effect tempered if that group has a large percentage of ex-prisoners?

As another example, black-white differences in kin imprisonment may have a direct effect on the racial wealth gap (Braman 2004). Research suggests that ties to poor and less-educated kin serve as an obstacle to individual financial well-being and wealth accumulation; differentials in incidence of such ties serve to explain a portion of the racial wealth gap (Heflin and Pattillo 2002, 2006; O'brien 2012). The effects of ties to prisoners and ex-prisoners—alters who make significant, unreciprocated demands on ego's resources—may be even more severe. Turney and Schneider (2016) provide initial support for this claim, demonstrating that imprisonment lowers odds of romantic partner's asset ownership. Such spillover effects, when evaluated at the network level and across the racial divide, may prove significant.

Strengths and Limitations

The results presented here are based on data constructed using a microsimulation strategy. Consequently, I conduct my analyses with data that is demographically complete and longitudinal for all individuals in the (simulated) populations of interest. This allows for the exact measurement of genealogical relatedness and the ability to track those genealogical linkages over both individual and historical time. I am able to explore the kinship configurations of the imprisoned population with an unprecedented level of detail. These data take into account female imprisonment and—via my exploratory analyses with education rates—class variation in imprisonment rates.

This study also suffers from a number of limitations. Some of these are inherent in the nature of simulated data. The kinship networks that I develop and describe above are not "real" (in the sense that they are not derived from measurements of real people). In other words, I observe only the structures, not the cultural patterns that underlie or result from them. And the consequences of these structures are largely hypothetical. I attempt to justify the hypotheses, but these data do not allow me to test them directly.

Other problems are related to data availability and my choices in the configuration of SOCSIM, the microsimulator. In an effort to streamline my process, I have omitted several factors that may be of importance. First, I do not account for the significant geographic variation in imprisonment rates (Muller and Wildeman 2016; Wakefield and Uggen 2010). The rates I use are nation-wide averages; lived experiences will be shaped depending on whether an individual (and her kin network) reside in a more or less punitive state. I also do not account for intra-familial correlations in risk of imprisonment, except via the education simulation. The simulations also rely on an assumption of strict racial homogamy. Such an assumption is fairly well warranted given historical American marital patterns, but may be less tenable moving forward.

Finally, the simulations provide estimates only for the risk and prevalence of imprisonment (prison incarceration) within kin networks. There is a class of individuals who experience jail incarceration but not imprisonment. These individuals—especially those charged with felonies—are subject to similar social sanctions and their families may bear burdens equivalent to those associated with kin imprisonment (Comfort 2016). My estimates do not capture the experience of such families, and thus necessarily underestimate the full reach of the carceral system into kin networks.

Conclusion

Understanding the collateral consequences of mass imprisonment and their effects on racial inequalities and stratification processes requires us to fully account for the affected. Meeting this requirement, I argue, is not simply a matter of getting the qualitative story right. Good existing research has already established that the consequences of mass imprisonment spill over into the lives of friends and relatives of the imprisoned, and that these collateral consequences fall unevenly by race and class. What we need, in addition, is a careful identification of the scale at which we assess our outcomes. Cast the net too narrowly and we are liable to mis-characterize the consequences of the modern carceral system by underestimating the likely exposure of individuals to those consequences. To wit, existing research has suggested the ways in which imprisonment affects the life chances of prisoners' most immediate family members: the children, partners, and, on occasion, parents of the imprisoned. However, the estimates presented in this chapter suggests that we may be missing over half the story of familial imprisonment if we fail to account for the connectedness of extended kin.

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Appendix to Chapter 3

A1. Rate Inputs

Table A1-1. Years of admission and release data known and interpolated for each year of simulation.

Simulation Years	Year of Admission Data	Year of Release Data
1960-1963	1960; 1961-1963*	1978
1964-1969	1964; 1965-1969*	1978
1970-1973	1970; 1971-1873*	1978
1974-1978	1974-1978	1978
1979-2013	1979-2013	1979-2013
2014+	2014	2014

*Interpolated

The earliest year for which we could locate release data is 1978, and so we hold the known 1978 release rates constant for earlier years. We do not expect this methodological choice to effect this study's findings in any appreciable way for two reasons: 1) historically, imprisonment rates held steady over the period 1960-1980 – this suggests that the 1978 release rates are not an unreasonable approximation for the rates of earlier years; and 2) our study's outcomes of interest are all based on measures of *first*, rather than *current*, imprisonment status – a slight mis-specification of release rates is not likely to affect these outcomes since when and whether current prisoners are released has no bearing on when and whether any other individual in the simulation is imprisoned for the first time.

Table A1-2. Year of known and interpolated race-, sex-, and age- distributions assumed for each year of admission and release data.

Admission

Year of Data	Year of Race Distribution	Year of Sex Distribution	Year of Age Distribution
1960-1963	1960; 1961-1963*	1964	1974
1964-1973	1964; 1965-1973*	1964-1973*	1974
1974-1978	1974-1978	1974; 1975-1978*	1974; 1973-1978*
1979-2013	1979-2013	1979-2013	1979-2013
2014+	2014	2014	2014

*Interpolated

Release

Year of Data	Year of Race Distribution	Year of Sex Distribution	Year of Age Distribution
1960-1973	1974	1991	1991
1974-1990	1974; 1975-1990*	1991	1991
1991-2013	1991-2013	1991-2013	1991-2013
2014+	2014	2014	2014

*Interpolated

For years with missing race-, sex-, and age- distribution information where there is no observed data to serve as the "lower bound" for the interpolation procedure, we apply the earliest known race-, sex-, and age- distribution. Also, for years where prisoners' race information is not further disaggregated into Hispanic and non-Hispanic categories, we downwardly adjust the given proportion of black and white prisoners according to the most contemporaneously reported proportion of Hispanic prisoners (United States Bureau of Justice Statistics, 2016b, 2016b, 2016a) such that we end up with plausible approximations for the proportion of total prisoners who are non-Hispanic black and non-Hispanic white.

A2. Calibration of SOCSIM via Maximum Likelihood Estimation

In order to recover results that are consistent with observed data, we calibrate our input rates against the known distribution of family sizes and life expectancies (TFR and e_0) at each ten-year interval from 1910 to 2009. This calibration is done via two scaling factors – θ_m and θ_f – that multiplicatively adjust the levels of the age-specific mortality and fertility inputs, respectively. What is thus assumed is confidence in the general shape of the age-specific mortality and fertility curves, but uncertainty regarding their magnitudes (Figure 1).

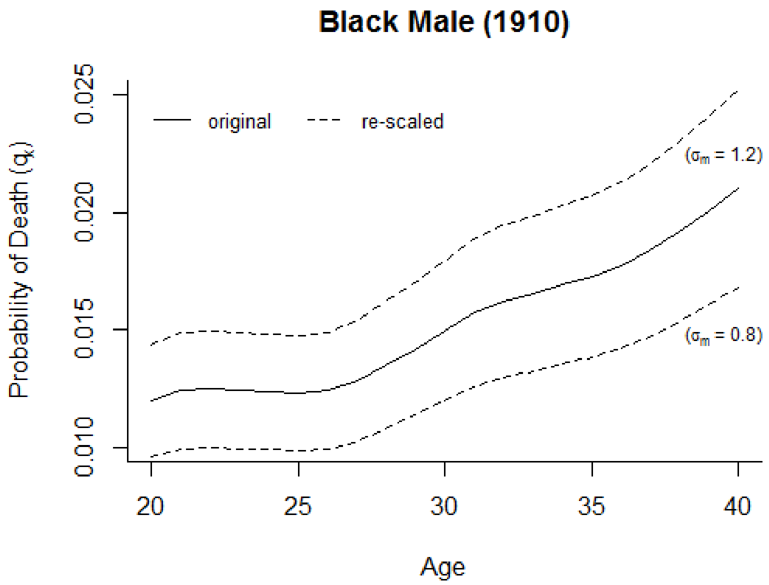

Figure A2-1. Example of re-scaled age-specific mortality curves. The area between the dashed lines demarcates the range of possible re-scaled values.

Procedurally, twenty candidate values are chosen (at even intervals) between the range 0.80 to 1.20 for each θ_m and θ_f parameter. This results in 400 possible (θ_m, θ_f) pairs. Each of these pairs are applied to the simulation's 11 sets of mortality and fertility inputs, and the simulation is then run to completion 25 times (for each pair of scaling factors) producing 25 unique values of TFR and e0. The variation and average of these outcomes over the 25 runs is used to compute a likelihood estimate of observing the true values of the outcomes assuming that the simulated outcomes are normally distributed. In sum, what is produced is an estimated likelihood surface that varies by θ_m and θ_f for each of the 11 input rates used in the simulation (Figure 2). The (θ_m , θ_f) pair that generate the highest likelihood value is then chosen as the final re-scaling parameter set.

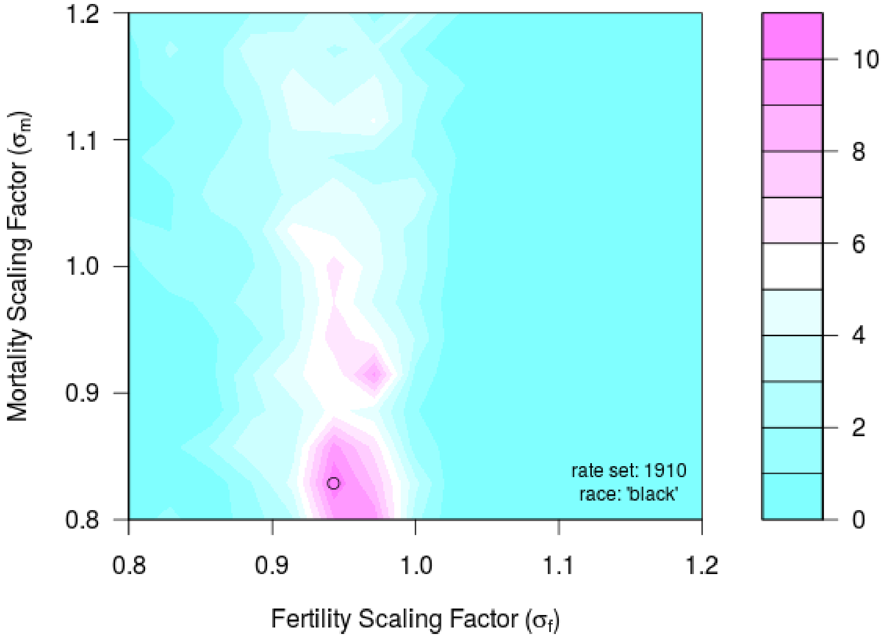

Figure A2-2. Example of estimated likelihood surface generated by the calibration procedure. The point marked by the hollow dot represents the (θ_m , θ_f) pair associated with the maximum likelihood value.

Thus in sum: (11 simulation input rate sets) x (400 re-scaling pairs) x (25 random simulations) = 110,000 calibration simulations are conducted to arrive at a final set of 11 re-scaling parameters. In concert, these 11 re-scaling parameters applied to our simulation's fertility and mortality inputs do a competent job of reproducing the expected TFR and e_0 values (Figure 3).

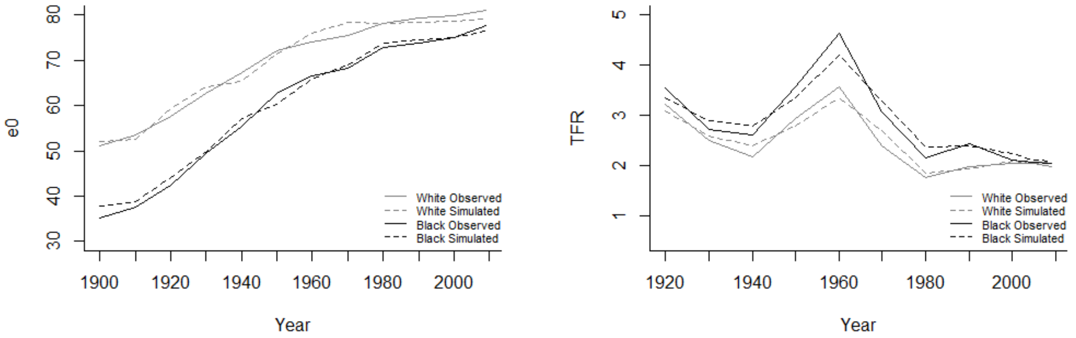

Figure A2-3. Period female life expectancy (e0) and total fertility rate (TFR): observed and simulated values.

An identical strategy is employed to calibrate the race-specific rates of prison admission and prison release to reliably re-produce observed population rates of first admission to prison (Carson & Golinelli, 2013) in simulation (Figure 4).

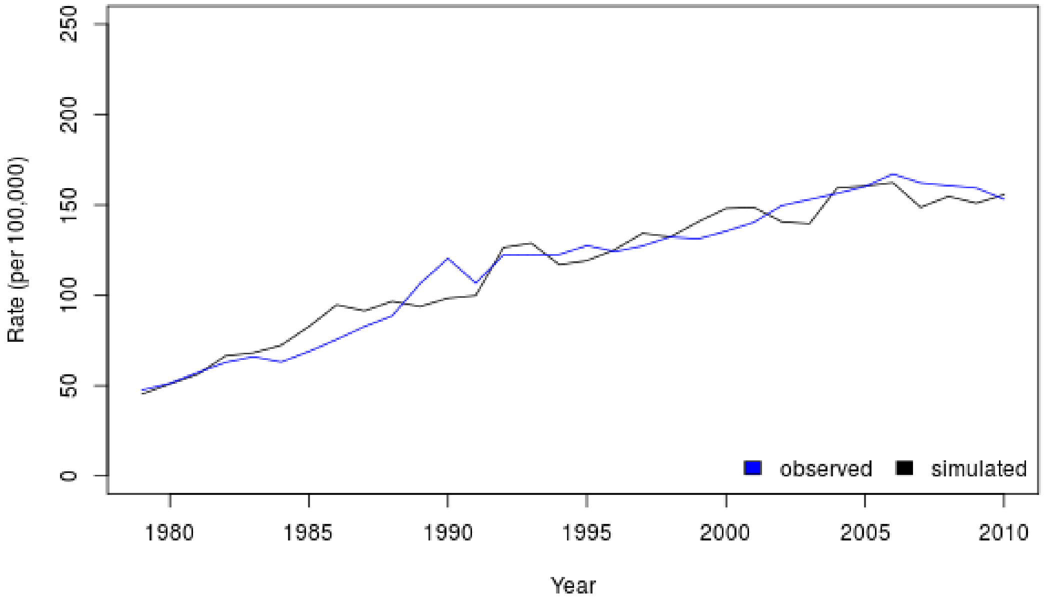

Figure A2-4. Period male first imprisonment rate (per 100,000): observed and simulated values. Race-specific rates are aggregated to allow comparison to observed rates (which are not reported separately by race).

Traditionally, calibration of this sort has been done via an informed trial-and-error methodology, but advances in computational power allow for more systematic optimization procedures, such as the one presented here (for similar applications see: Ševčíková, Raftery, & Waddell (2007); Zagheni (2011)). That being said, the need for these calibration steps should alert the reader to the danger of placing too much confidence in the exact magnitudes of effect being reported here (or in any other microsimulation study). These concerns, however, should be much less pronounced when considering the relative differences between two identically-configured simulations that vary only in their initial inputs as is the case in the present study.

A3. Replication of Prior Findings

To check the overall credibility of our fully calibrated microsimulation model, we attempt to replicate measures of own and family imprisonment reported by three prominently cited studies:

1. Western & Wildeman (2009): The cumulative probability of imprisonment for black and white men by age 30-34 (for 5-year birth cohorts over the period 1960-1979[16]).

2. Wildeman (2009): The cumulative probability of imprisonment of parents (fathers and mothers) for black and white children by age 14 (born 1978 and 1990).

3. H. Lee et al. (2015): The proportion of black and white Americans in 2006 who have at least one family member in prison and the average number of imprisoned family members.

The following tables gives the results of our replication exercises:

Table A3-1. Cumulative probability of imprisonment for black and white men by age 30-34 (for 5-year birth cohorts over the period 1960-1979: original values and simulated values.

	Birth Cohort			
	1960-1964	1965-1969	1970-1974	1975-1979
Western & Wildeman (2009)				
1. Black	15.2%	20.3%	22.8%	20.7%
2. White	2.2%	2.8%	2.8%	3.3%
Simulation				
1. Black	14.6%	20.2%	23.9%	23.4%
2. White	1.8%	3.0%	3.3%	3.4%

Table A3-2. Cumulative probability of imprisonment of parents (mothers and fathers) for black and white children by age 14 (born 1978 and 1990): original values and simulated values.

	Birth Year			
	1978		1990	
	Mother	Father	Mother	Father
Wildeman (2009)				
1. Black	1.4%	13.4%	3.2%	24.5%
2. White	0.2%	2.1%	0.6%	3.6%
Simulation				
1. Black	1.9%	11.1%	3.3%	25.1%
2. White	0.5%	1.9%	0.7%	4.1%

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[16] Western & Wildeman (2009) reports cumulative probabilities for cohorts born as early as 1945, but our simulation starts in 1960 and so we compare results for only those cohorts for which we are able to generate estimates.

Table A3-3. The proportion of black and white Americans 18-years or older in 2006 who have at least one family member in prison and the average number of imprisoned family members: original values and simulated values.

	Proportion w/1 or More Family Member in Prison	Average Number of Imprisoned Kin
Lee et al. (2015)		
1. Black Men	0.320	0.84 (1.80)
2. Black Women	0.438	1.63 (3.24)
3. White Men	0.056	0.08 (0.39)
4. White Women	0.116	0.14 (0.45)
Simulation		
1. Black Men	0.348	0.65
2. Black Women	0.382	0.72
3. White Men	0.066	0.10
4. White Women	0.073	0.11

Note: Values from H. Lee et al. (2015) reflect black and white Americans in 2006 who "know" at least one family member in prison. Numbers in parentheses are standard errors. Standard errors for the "Proportion" measure are not reported by H. Lee et al. (2015).

Happily, our microsimulation returns values that are in close agreement with those reported by Western & Wildeman (2009) and Wildeman (2009). This is perhaps not surprising given that the life table methods that are used by these authors are closely related to the underlying mechanism that drives our microsimulator. Nevertheless, it is still encouraging to see agreement on these values of interest given that our estimates reflect the *joint* effect of fertility, mortality, and imprisonment input factors all operating in tandem. In sum, it seems fair to say that our microsimulation strategy performs no worse in its ability to estimate cohort-level kin imprisonment status than the estimation strategies used by Western and Wildeman.

As for the somewhat larger discrepancy between our estimates and the survey results of H. Lee et al. (2015), we can anticipate at least two factors that might account for these deviations. First, the General Social Survey (GSS) item that H. Lee et al. (2015) draw on for their estimates rely on in-the-moment respondent recall – the item in question asks: "Next, we are going to ask questions about people in your family, including relatives and in-laws. How many are currently in state or federal prison?" Thus there exists a distinct possibility of mis-reporting due to imperfect recollection (especially for more extended kin relations). Second, our simulation models are calibrated to reliably reproduce ever-imprisonment status rather than current-imprisonment status, and so some disagreement in the exact moment-to-moment imprisonment status of individuals observed in the GSS population versus in our simulated population is to be expected. Fortunately, the reliability of our study's results do not depend on the accurate estimation of *current* imprisonment status (only *ever* imprisonment status). That being said, our simulated values are all still rather close to those reported by H. Lee et al. (2015). For example, our estimates of average number of imprisoned family members fall well within a single standard deviation of these authors' estimates.

A4. Exploratory Models of Kin Imprisonment by Educational Attainment

The patterns in kin imprisonment we have described are population averages. Previous research has documented a strong class differential in the effects of mass imprisonment; the least educated face higher risks than their more-educated counterparts of being incarcerated. The correlation of educational attainment within families leads us to suspect that this burden of kin imprisonment is not evenly borne across the population. That is, families who have a greater proportion of less-educated members likely have higher rates of kin imprisonment, while those with a higher proportion of more-educated members experience less kin imprisonment.

We present here exploratory results from a sensitivity analyses in which we employ education-varying imprisonment rates and make the strong assumption of total educational homogamy within families. That is, we model kin imprisonment for blacks and whites as though each was made up of three wholly separate populations: those without a high school diploma, those with a high school diploma or equivalent, and those with some college or more. Individuals from the first population – non-high school graduates – come from families where all members are non-graduates, partner with non-graduates, and give birth to future non-graduates. All members thus face the increased imprisonment risks that come with that status. The same holds for the other groups.

Within SOCSIM, our microsimulator, we build three separate models that are specified identically to the non-stratified models we've been using so far with the exception of multiplicatively adjusted prison admission rates. These adjustment factors are derived from Pettit & Western (2004) (table 4) and are exactly equivalent to the ratio of imprisonment risk at each educational strata to the average population risk. For example: in the period 1979, white men were incarcerated at an average rate of 0.4%; however white men who never completed high school were incarcerated at a rate of 1.0%. Thus, we scale prison admission rates up by a factor of 0.4/1.0 = 2.5 for our simulation of white Americans who never completed high school in order to reflect this observed class difference in imprisonment risk.

This represents an obviously unrealistic model of the world. Parents' education is correlated with children's education, but not perfectly. Some percentage of the children of high school drop-outs will go on to earn college degrees, just as a fraction of the offspring of college graduates will never make it through high school. Educational assortative mating, likewise, is a well-documented and increasingly-common phenomenon, but it is hardly a universal practice (Greenwood, Guner, Kocharkov, & Santos, 2014; Schwartz & Mare, 2005). What this exercise helps us to establish, despite its implausibility, are the "outside bounds" of the range. The families with no high school graduates experience the worst that the system has to offer, while those in which all members have some college will be in the best position. Real-world families will fall somewhere in-between.

To describe the range of experience we curtail our focus to just the boom cohort (those born 1960-1970) and just to measures of the prevalence of kin imprisonment among kin of working age. Figure A4-1 replicates the plots from Figure 4, split here by family education. The top panel presents results for white families and the bottom panel for black families. Moving left to right, the figures display kin availability in families made up entirely of non-high school graduates, families in which all members have a high school diploma or equivalent, and families in which all members have some college or more.

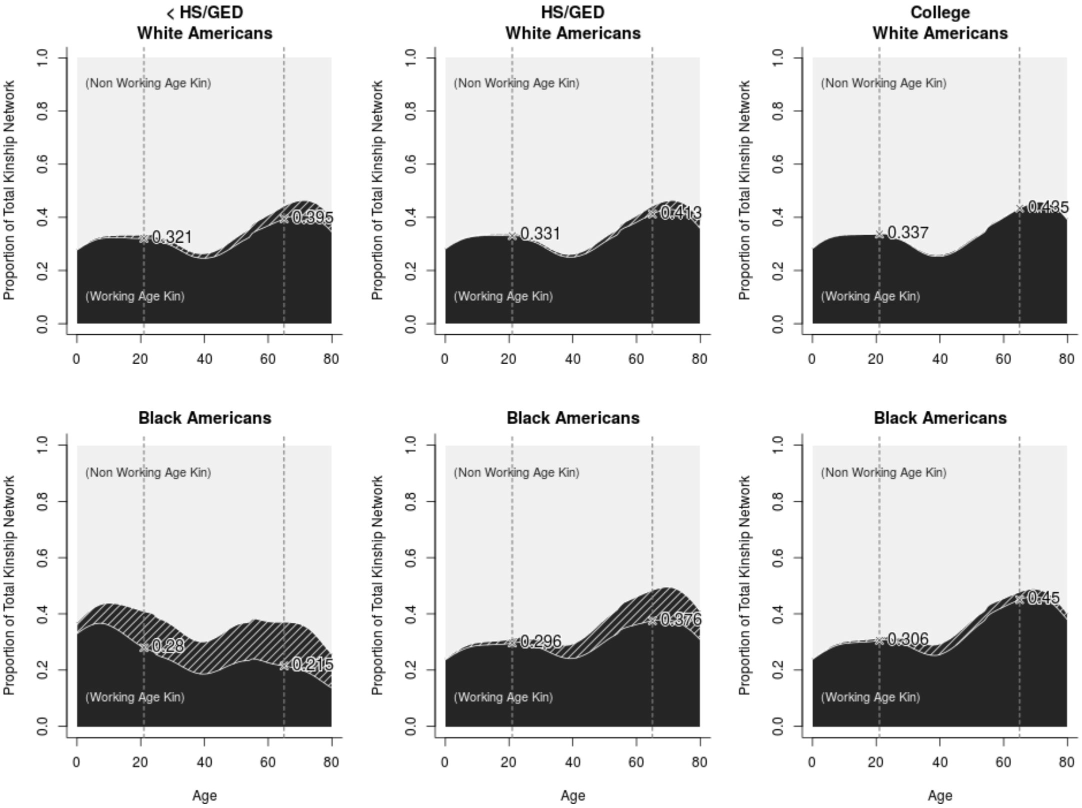

Figure A4-1. Education-specific availability of never-incarcerated, working-age (25-54 y.o.) kin in the "boom" (1960-1970) cohort. The top plots illustrate the proportions of working-age kin for white individuals; while the bottom plots illustrate the same for black individuals. The shaded regions indicate the share of working-age kin who have ever been incarcerated. Points marked by x's indicate the proportion of kin who are working age and have never been incarcerated when ego is age 21 and 65.

For both white and black populations, increasing education is associated with greater availability of never-incarcerated working-age kin. Over the course of life, white and black Americans with less than a high school education lose 7.9% and 49.3%, respectively, of their working-age kin to imprisonment. This represents a loss of 35.8 person-years of potential kin support for white Americans, and a loss of 129.8 person-years for black Americans. In contrast, white college-educated Americans lose 1.0% and black college-educated Americans 6.7% of their working-age kin to imprisonment. This translates to 5.2 person-years of potential kin support lost for whites and 40.2 person-years for blacks. Note that it takes a black family composed entirely of college-educated individuals (the theoretical “best-case” scenario for black Americans) to reach a level of familial imprisonment similar to that of a white family composed entirely of individuals with less than a high school education (the theoretical “worst-case” scenario for white Americans).

Thus, while education seems to be an important mediator of an individual’s exposure to family imprisonment, race remains the dominant determinant of an individual’s overall experience of familial imprisonment. This finding reinforces what has been found within close friend and family networks by previous research using empirical data (Bobo & Thompson, 2010).

Conclusion.
The Growing Divide

In this dissertation project, I have attempted to characterize the shifts in the family composition of black and white Americans over the course of the 20th Century. In order to accomplish this, I employed a demographic estimation technique implemented through a microsimulation framework to translate historically-observed trends in fertility, mortality, and imprisonment into the implied trends in kinship composition. Compared to much of the existing research on American family structure, which has relied on a household-centric view of the family, this method of investigating family composition allowed me to take a more *network*-centric view of the family that generalized away from the co-residence of kin toward the *co-existence* of kin.

From this perspective, we observed (in Chapter 2) that the availability of surviving kin and the age-specific trajectory with which Americans gained and lost them differed for black and white individuals over much of the past century. In particular, black Americans—relative to their white peers—had fewer kinship resources over most ages, a trend characterized by earlier orphanhood, lower lifetime probabilities of transitioning into most kinship relations, and shorter durations spent in those relations once achieved. For example, compared to white Americans, 18% fewer black Americans born in the period 1940-1950 ever survived to become a grandparent, and those who did had an average of two and a half fewer years in that relation before either they or their grandchildren passed away. For those born into later cohorts, this race gap in age-specific kinship probabilities diminished, but did not disappear entirely.

One strong driver of these race gaps in age-specific kinship probabilities were race differences in familial mortality. For example, by the time the average black American, born in the period 1940-1950, reached adulthood (i.e. age 21), she is likely to have suffered 60% more deaths in the family than her white peers, and these deaths are likely to have been experienced at much earlier ages. Sixty years later, for those born in the period 2000-2010, the race gap in familial mortality expectations persists: though the absolute numbers of black and white family members who pass away at each age are likely to shrink and thereby grow more similar, black minors will still experience 58% more deaths in the family, on average, than their white peers by age 21.

In Chapter 3, we observed the risk and prevalence of imprisonment within black and white kinship networks over the course of the *prison boom*.[17] Among those who were born in the 1960s—those reaching adulthood during the high-water mark of the movement toward mass incarceration—black Americans were at greatest risk of having a family member go to prison. For example, by the time the average black individual reached age 65, 15.2% of her kin had ever been imprisoned. In stark contrast, the equivalent figure for the average 65-year-old white individual was 3.6%. For those born in the period 1985-1995—the very height of the prison boom—I estimate a very similar situation: by age 65, 15.3% and 5.2%, respectively, of the average black and white individuals' surviving kin are expected to have acquired a prison record.

Though the lifetime prevalence of family imprisonment for those born *before* versus *during* the prison boom are similar, the age-distribution of familial imprisonment risk is not. While those in the earlier cohort saw many of their kin become imprisoned during their adult years, those in the later cohort saw many more of their kin become imprisoned during their childhood and adolescence. To wit, the average black and white individuals in the earlier cohort were 17 and 54 years old, respectively, when they saw a family member go to prison for the first time. In the later cohort, those average ages at first kin imprisonment were substantially younger at 7 and 39 years old, respectively. While these cross-cohort differences in the timing of kin imprisonment conform to expectations, they nevertheless remain quite striking—especially for the case of black Americans: at the height of the prison boom, black children who witnessed the imprisonment of a relative did so, on average, *at just seven years old!*

The Demography-Policy Crossover

Putting it all together, we see that as the demography of the black and white populations in the United States began to converge over the course of the 20th Century, so too did the age-specific pattern of kinship. In other words, increasing similarity in fertility and mortality trends led to more similar family network structures over more of the life course for black and white Americans. Certainly, the race gaps in kin availability and timing of kinship transitions did not disappear completely, but they *were* notably reduced in each successive generation. However, socio-political developments in the latter half of the 20th Century led to a dramatic increase in the national rate of incarceration, which began to create a new source of divergence in the family lives of black and white

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[17] The "prison boom" refers to a dramatic expansion in nation-wide incarceration rates that started in the mid-80s.

Americans. In particular, black Americans were (and continue to be) at disproportionately greater risk of imprisonment.[18]

Orlando Patterson, writing about the human toll of slavery in the United States, introduced the notion of "social death" to describe the systematic eradication of the social, political, and personal legitimacy of the enslaved (Patterson 1982). Since then, the term has been expanded to describe the condition of those whose lives have been irrevocably disrupted by the system of mass imprisonment (Price 2015). Through the physical removal of their bodies, the legal removal of their rights and freedoms, and the symbolic removal of their social identities, countless Americans— disproportionately black and poor—have been rendered *persona nullus* in the eyes of greater society: un-employable, un-marriageable, and a liability to their friends and families.

If we take the "social death" argument seriously and account for the loss of family members to imprisonment alongside the loss of family members to death, then we begin to see what we might call a *demography-policy crossover* in the maintenance of the race gap in family composition. Whereas diminishing race differences in fertility and mortality slowly shrank black-white differences in kin availability over the past century (Chapter 2), dramatically increasing race differences in the risk of incarceration worked in the opposite direction (Chapter 3). The net effect of this "crossover" has been increasing inequality in the availability of kin between black and white Americans over the past century.

Placed in the context of the historical debate surrounding the supposed "breakdown" of the black American family, the demography-policy crossover highlights two important conclusions. First, the "breakdown" of black families was never an inevitable outcome. The demography, in fact, worked against it. Had scholars and politicians during the mid-century approached the issue paying as much attention to the network structure of families as they did to the co-residential behavior of families, they may have realized that the long-term trend in family composition was gradual convergence across race groups. Second, to the extent that black families did begin to diverge from white family norms, that divergence was the result of an increasingly punitive legal system that disproportionately affected black Americans and their families. In such a way, social and political factors "took over" for demographic factors in the maintenance and eventual expansion of racial inequalities in the availability of kin.

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[18] For example, among those born in the period 1965-1969, it is estimated that 1 in 5 black men (versus 1 in 30 white men) had served some time in prison by their early thirties (Pettit and Western 2004).

Where To From Here?

In the introductory chapter to this dissertation project, I wrote about the need for research on the American family to decouple "households" from "families" in order to see beyond familial *co-residence* to familial *co-existence*. In many ways, this effort to escape the limits of the household boundary and to re-focus the analytic lens on the full network of surviving kin was the unifying goal shared across all subsequent chapters in this work. Having now addressed this goal (to varying degrees of success), I would like to suggest that the next big step in this line of inquiry should be to decouple "family" from "support."

We are all aware that many factors—wealth, health, geography, love, and trust—all play important roles in determining whether one's network of kin ultimately represents a source of net gain or strain. The simple fact that our kin are present and available does not guarantee that they will be active in that role. In previous chapters, I made the argument that getting a clear picture of family structure is important in order to understand the boundaries of *potential* family support. However, having identified those boundaries, we can begin to make additional progress by shifting our attention toward the study of *realized* family support.

Moving in this way, from the study of potential to realized support, I suspect, will require a different set of methodologies and questions than the ones I've explored so far in this work. As I noted in the previous section, the forces that determine the ability of family members to fulfill their roles and obligations to each other are increasingly social and political rather than demographic. The right questions to ask under these circumstances will necessarily be trickier than any that can be tackled using demographic estimation techniques alone. Nevertheless, these questions must be asked because how we ultimately answer them will become ever more important to the future of the racial divide in American family life.

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