TITLE

KINSHIP AND CARE:
RACIAL DISPARITIES IN DEMENTIA CAREGIVING IN THE U.S. FROM 2000 TO 2060

ABSTRACT

Objectives

Although the family plays a pivotal role in older adults' care, there is limited research on how evolving demographic trends affect racial disparities in older adults' support networks and how the disparities change over time. In our study, we examine the interrelationship between shifting family demographics and future care needs for older adults with dementia, emphasizing the disparities between Black and White populations in the U.S.

Methods

Using demographic models of kinship, we estimated the availability of caregivers, and the dementia prevalence among one's kinship network by race, kin types, and the age of a focal person from 2000 to 2060. We have developed an index called the "dementia dependency ratio" to assess dementia caregiving demands at the population level, taking into account the age and kinship structures.

Results

Our findings suggest that Black individuals tend to have more children, grandchildren, and nieces/nephews as they age. However, our research also revealed a higher prevalence of dementia within Black kinship networks compared to their White counterparts. This elevated prevalence of dementia among Black kinship networks has the potential to counterbalance the advantage of having larger kinship networks among Black individuals as indicated by the index of dementia dependency ratio, ultimately resulting in a greater demand for dementia caregiving within the Black community.

Discussion

These findings emphasize the urgency of addressing the racial gap in dementia prevalence rates and increasing public support for extended family members, who are larger in size and have the potential to share the caregiving responsibilities experienced by nuclear families.

Keyworks

Kinship, caregiving, race, projection, dementia

INTRODUCTION

Family members play a crucial role in caring for older adults, particularly those with dementia, and this role becomes even more significant as the population ages. However, the availability of family members, or kin, can differ significantly among various racial groups. Studies on Black-White disparities in old adults' support networks in the U.S. have produced mixed results. Some research indicates that Black older adults have smaller networks of children and relatives than their White peers (Barnes, Mendes de Leon, Bienias, Evans, 2004; Ajrouch, Antonucci, & Janevic, 2001). Other studies present an opposite view (Roth, Haley, Wadley, Clay & Howard, 2007; Oyeyemi et al., 2023). For instance, Oyeyemi et al. (2023) found that Black older adults had more extensive assistance networks, with a higher number of family helpers, both prior to and during the COVID-19 pandemic, than their White counterparts. Similarly, Roth et al. (2007) reported that White individuals were more likely than Black individuals to perceive lower caregiver availability. As noted in previous research, discrepancies in findings may arise from variations in network definitions and the operationalization of informal social support across studies (Sarkisian & Gerstel, 2004). Factors such as life stage and gender of the participants might also influence these outcomes (Silverstein & Waite, 1993).

However, another often-overlooked factor in understanding these racial discrepancies is the evolving composition and size of family networks over time, due to long-term demographic trends and complex interplays between fertility and mortality patterns (Jiang, Zuo, Guo, Caswell, & Tuljapurkar, 2023). For instance, the increase in life expectancy has substantially extended the anticipated number of years an individual might spend with their grandchildren (Song & Mare, 2019). High fertility rates create a larger "sandwich" generation in many countries, where individuals find themselves squeezed between caring for dependent children and frail older parents (Alburez-Gutierrez, Mason, & Zagheni, 2021). The interplay of changing fertility and mortality rates suggests

that an individual's family structure and kinship network, both in size and composition, can vary depending on their age and the specific period in which they live. Research on family support networks conducted 30 years ago may yield different findings compared to contemporary studies, simply because family structures and kinship networks evolve over time.

With the growing accessibility of multigenerational data (Song & Campbell, 2017) and advances in methodology (Alburez-Gutierrez et al., 2022), researchers have only recently begun to examine racial differences in kinship size and composition (Daw, Verdery, & Margolis, 2016; Reyes, Schoeni, & Freedman, 2021). Most studies have centered on results for a single year, with Verdery and Margolis (2017) being a notable exception. Research exploring how shifting demographic trends influence racial disparities in adult adults' support networks, and how these differences may change over time, remains under-studied (Freedman et al., 2023). Research examining the composition of older adults' support networks indicates that White older adults tend to receive more support from spouses, whereas Black Americans are more likely to have support from children and other relatives, underscoring the differences in Black-White family structures, norms, and values (Janevic & Connell, 2001; Pinquart & Sörensen, 2005; Roth et al., 2007). This trend is part of a broader pattern: older adults in need of long-term care, especially those who are single or childless, frequently report receiving informal support from siblings and other kin (Spillman, Favreault, & Allen, 2020). Furthermore, as the proportion of the single or childless demographic grows, there is an anticipated rise in reliance on extended families (Bengtson, 2001), particularly among the Baby Boomer generation (Redfoot, Feinberg, & Houser, 2013), and in time of crises like the COVID-19 pandemic (Reed, Pesando, Harris, Furstenberg & Teitler, 2023). Such patterns highlight the need to continually examine changes in kinship size and dynamics over time and its implications on the older adult care.

In this study, we adopt innovative demographic models to investigate the interrelations between changing family demography and future care needs for older adults with dementia, with a focus on the Black and White differences in the U.S. We focus on dementia care in our study because, in comparison to other forms of older adults' care, dementia care is notably more intensive and typically involves a larger number of caregivers (Kasper, Freedman, Spillman, & Wolff, 2015; Spillman, Freedman, Kasper, & Wolff, 2020). Our emphasis on the disparity between Black and White populations is informed by findings that Black individuals consistently exhibit a higher prevalence of dementia than Whites (Matthews et al., 2019; Roy, Wang, & Xu, 2023; Zhu, Chen, Crimmins, & Zissimopoulos, 2021), although recent studies indicate an overall decline in dementia prevalence (Freedman, Kasper, Spillman & Plassman, 2018) and a narrowing gap between Black and White males (Hudomiet, Hurd, & Rohwedder, 2022). Furthermore, Black caregivers typically contend with more intense caregiving responsibilities and face greater financial challenges compared to their White peers (Fabius, Wolff, & Kasper, 2020; Liu, Chi, & Wu, 2022). The Black-White inequality in caregiving is jointly shaped by unequal demand for and supply of kin who can serve as caregivers.

Specifically, we project the kinship network's size and composition for a randomly chosen individual, termed as Focal, by race, kin types, and the Focal's age. To ease discussion, we present the number of available kin by kin types for Focal aged 65 and 80 from 2000 to 2060. Applying race- and age-specific dementia prevalence to the kinship network, we also derive estimates of the possibility of having at least one kin with dementia by race, kin types, and the age of Focal. Lastly, we introduce a dementia dependency index, calculated as the ratio of the Focal's kin with dementia to their working-age kin without dementia. This index quantifies the changing dementia caregiving needs at the population level over time, taking into account the evolution of both age and kinship structures.

DATA AND METHOD

Kinship Model with Time-Varying Rates

For our projection analysis, we employ recently developed demographic models of kinship, which have been extensively detailed in Caswell (2019, 2020, 2022) and Caswell and Song (2021). This approach utilizes time-varying age-specific demographic rates to derive various summary statistics of kinship networks. The fundamental methodology underlying this approach is to treat each type of kin of the Focal as a distinct population and to project these populations from one age of the Focal to the next using matrix population models. This approach has been previously applied to investigate kin loss (Caswell, Margolis & Verdery, 2023), racial disparities in exposure to unemployment (Song & Caswell, 2022), and dementia caregiving demands in China (Feng, Song & Caswell, 2023). While recent research has successfully derived kinship networks directly in regions with high-quality administrative register data, such as the study by Kolk, Andersson, Pettersson, & Drefahl (2021) for Sweden, analytical mathematical models or simulations remain essential for projecting future kinship structures. We employed the recently introduced R package, *DemoKin*, for our calculations (Williams, Alburez-Gutierrez, Song & Caswell, 2022).

Dementia Prevalence among Kinship Network

Let $k(x, t)$ represent the age distribution of a specific type of kin relative to a Focal individual aged x at time t. If Ψ is a vector containing age-specific prevalences of dementia, then the expected number of kin with dementia at age x of Focal at time t *is*:

$$y(x,t) = \Psi(t)^T k(x,t) \quad (1)$$

We calculate the probability that Focal, at age x and time t, has at least one kin of a specific type with dementia based on the number of kin with dementia. This calculation employs a Poisson approximation, similar to the approach used in Song and Mare (2019) and Song, Campbell, and Lee

(2015). If the expected number of kin with dementia at time *t* is *y(t),* under the Poisson assumption, the probability of having at least one such kin is as follows:

$$P(at\ least\ one\ kin\ with\ dementia) = 1 - e^{-y(t)} \quad (2)$$

Dementia Dependency Ratio

We define a dementia dependency ratio (DDR) as the ratio between the number of kin with dementia of Focal at age *x* and the number of kin without dementia of Focal at age of *x*:

$$DDR(x,t) = \frac{kin\ with\ dementia}{kin\ without\ dementia\ aged\ 25{-}64} = \frac{y(x,t)}{(1-\Psi_{25-64})^T k(x,t)} \quad (3)$$

Our index, which factors in the kinship structure, is an improvement over the traditional demographic age dependency ratio or caregiver support ratio, which primarily relies on the total population. A similar index was previously established by Wolf (1986) and Tu, Freedman, and Wolf (1993). The DDR can be interpreted as a measure of the caregiving demands that kin with dementia places on kin without dementia in working ages. For the purposes of our study, we define the working age population as individuals aged between 25 and 64.

The Dementia Caregiving Demands at the Population Level

The vector *k(x, t)* gives the age distribution of the kin, of type *k,* of Focal at age *x*. Thus, the dementia prevalence and the dementia dependency ratio capture the expected caregiving demands of dementia within a family. A population can be conceptualized as a collection of Focal individuals characterized by an age structure, represented by *n(t)*. The overall kinship structure in the population can be weighted by taking an average over this age distribution.

We define the proportional age distribution as follows:

$$w(t) = \frac{n(t)}{\|n(t)\|} \quad (4)$$

Then the age-weighted, population dependency ratio is expressed as:

$$DDR(\text{pop}) = \sum_x w_x(t) DDR(x,t) \quad (5)$$

This quantity, as a singular numeric index, represents the expected dementia dependency ratio for an individual randomly chosen from the population in a single year. We calculate this index for all years between 2000 and 2060 for both racial groups.

Vital Statistics

We obtained period estimates of age-specific fertility rates by race from Heuser's (1976) fertility table for the years 1917 to 1980 and from the National Vital Statistics Reports for the years 1981 to 2018. Heuser compiled fertility tables produced by the National Institute of Child Health and Development but corrected for undercounts and age misreporting. The fertility rates are tabulated for ages 14 to 49. The original Heuser's calculations include fertility tables through 1973 but the Office of Population Research at Princeton University updated that tables for years between 1974 and 1980.[1] The National Vital Statistics provide fertility rates in 5-year age groups for ages 10 to 49. We assume the fertility rate is zero for ages that are beyond the observed age range.

We obtained period estimates of age-specific survival rates by race from the United States Life Table and National Vital Statistics Reports published by the U.S. Census Bureau. For years when only abridged life tables were provided, we employed linear interpolation to estimate single age estimates of l_x. For the years prior to 1996, when mortality data was limited to ages between 0 and 85, we extrapolate the mortality curve for older ages up to age 100 using the Gompertz model. We use only female rates for mortality and fertility. To approximate the overall number of kin, we adopt

[1] Heuser's U.S. Cohort and Period Fertility Tables can be downloaded from the OPR data archive: https://oprdata.princeton.edu/Archive/CPFT/ (Accessed September 30, 2023).

a method by Goodman, Keyfitz, and Pullum (1974) which assumes identical rates for males and females (For an application of this method, see Song and Caswell (2022)).

Population projection

We use the 2017 National Population Projections Datasets from the U.S. Census Bureau. The data provide projected age-specific fertility rates by race for women aged 14 to 54 and age-specific mortality rates by race for both men and women aged 0 to 100, spanning from 2017 to 2060. We convert the age-specific mortality rates to age-specific survival rates (i.e., l_x in the life table). We also derive the age distribution by using population projections for each single year of age and race from 2016 to 2060.

Dementia Prevalence

We derive the age-specific dementia prevalence rate by race from the findings of Hudomiet et al. (2022), who estimated this prevalence based on data from the Health and Retirement Study. Dementia prevalence estimates are available every two years from 2000 to 2016. In cases where no observation is available for a specific year, we utilize the dementia prevalence rate from the preceding year. We first obtain dementia prevalence rates by race in seven five-year age groups (65-69, 70-74, 75-79, 80-85, 86-89, 90-94, 95-100), covering the age range from 65 to 100 years. Next, we apply a linear interpolation to estimate dementia rates for each individual year within the age range. Dementia prevalence is assumed to be zero before the age of 65. In our analysis involving projections, we assume that the race- and age-specific dementia prevalence rates remained constant at the levels observed in 2016 from 2017 to 2060.

RESULTS

Figure 1 illustrates the variation in the number of kin by race and kin type for individuals of different ages in the year 2016. The observed racial differences reflect the historical disparities in fertility and mortality rates between Black and White populations. Higher fertility and an earlier age at childbearing tend to yield a greater number of kin, whereas higher mortality reduces the number of kin. Notably, Black individuals tend to have more children, grandchildren, great-grandchildren, aunts/uncles, nieces/nephews, and cousins compared to their White counterparts.

INSERT FIGURE 1 HERE

The curves representing the number of parents, grandparents, and great-grandparents resemble survival curves because the maximum number of biological parents, grandparents, and great-grandparents are fixed. Here, the coexisting time between individuals and their parents and grandparents is longer for White individuals than Black individuals, mainly due to lower mortality rates of the White population. The overlapping lifetime between individuals and their great-grandparents is higher for Black individuals than White individuals. This pattern can be attributed to the younger childbearing age within the Black population, making younger Black individuals more likely to have great-grandparents who are still alive. Similarly, Black individuals tend to have more siblings than their White counterparts before the age of 74; however, this trend reverses after 74, primarily due to the difference in mortality rates between the two populations.

A crucial question in understanding the support systems available for older adults is assessing the number of available family members whom they can rely on. Figure 2 presents the projected count of available kin by race and kin type for individuals at ages 65 and 85 from 2000 to 2060. We have excluded the numbers for parents, grandparents, great-grandparents, and aunts/uncles, under the assumption that individuals in these categories are at a very old age and can provide limited assistance themselves.

INSERT FIGURE 2 HERE

From 2000 to 2060, Black individuals at older ages are projected to have a higher number of children, grandchildren, and nieces/nephews. Some of the differences observed are substantial. For instance, in 2020, Black individuals at age 85 are expected, on average, to have two more grandchildren and one more child than White individuals of the same age. In contrast, White individuals at the age of 85 are projected to have more siblings than their Black counterparts from 2000 to 2025, reflecting the racial differences in mortality patterns. However, this trend is expected to reverse after 2025, with Black individuals at age 85 surpassing White individuals in the number of siblings. Similarly, in 2025, Black individuals at age 85 are projected to have more cousins than their White counterparts. The changes in the number of kin for individuals in old age do not follow a straightforward, linear trajectory. Instead, they exhibit fluctuations indicative of dynamic changes in kinship structures, driven by the interplay between fertility and mortality. For example, the peak in the number of children earlier in the century reflects the trend of increased fertility rates post-World War II, indicating that old-age individuals in this period are parents of the Baby Boomer generation.

Next, Figure 3 displays the prevalence of dementia in different kin groups for the years 2000, 2016, and 2060. Note that the prevalence estimate here refers to the probability of having at least one kin member with dementia. For projections in 2060, we use the observed dementia prevalence rate from 2016. In nearly all kin types across all the years studied, an average Black individual has higher probabilities of having kin with dementia compared to an average White individual. Moreover, the probability curve for Black individuals peaks earlier than that for White individuals, suggesting that Black individuals may face a greater likelihood of having kin with dementia at relatively younger ages than their White counterparts.

INSERT FIGURE 3 HERE

The probability of having at least one kin member with dementia showed a decline from 2000 to 2016, before experiencing an increase again by 2060. The reduction from 2000 to 2016 can

be attributed to the decline in dementia prevalence rate, particularly among the White population. Nonetheless, by 2060, the probability of having at least one kin with dementia is projected to increase for both Black and White populations. This trend aligns with the anticipated decrease in mortality and increase in life expectancy observed across both racial groups. It suggests that even if the prevalence of dementia remains at the 2016 level, changes in kinship structures could drive an increase in dementia prevalence within kinship networks.

The probability of having at least one kin with dementia is strikingly high for certain kin types at specific ages of Focal. For instance, Black individuals at age 85 are projected to have a 45% chance of having at least one cousin with dementia in 2016, and this figure is expected to rise to 76% in 2060. This is attributed to the relatively larger cousin population, which increases the probability of having at least one cousin with dementia. However, the probabilities are also substantial for other close kin types such as siblings, parents, and grandparents. For example, Black individuals at age 60 have a 16% chance of having at least one parent with dementia, which is 3% higher than White individuals, and this is projected to increase to 26% in 2060, 7% higher than White individuals. Overall, between 2016 and 2060, the probabilities of having kin with dementia increase substantially for both racial groups. With time, the racial gap in nearly all these different types of kin dementia prevalence rates will widen.

Old age dependency ratio, calculated as the ratio of the number of individuals typically aged 65 and older to the number of working-age individuals, is commonly used for evaluating the level of support—such as pensions, healthcare, and caregiving—that the older population may require from the working-age population. Following this vein of research, we introduce the Dementia Dependency Ratio (DDR) index to assess the caregiving demands associated with dementia. The age-specific DDR index is measured by calculating the ratio of a Focal individual's kin with dementia

(as shown in Figure 4A) to available kin aged between 25 to 64 without dementia (as shown in Figure 4B), at a specific age of Focal.

INSERT FIGURE 4 HERE

The DDR is determined by calculating the ratio of kin with dementia of Focal at a certain age (Figure 4A) to kin aged between 25 to 64 without dementia of the Focal at that age (Figure 4B). Figure 4A shows that beginning around age 38 for Black and 35 for White, as individuals age, they tend to have an increasing number of kin diagnosed with dementia. Figure 4B shows an almost reversed trend: individuals have a declining number of working-age kin without dementia after their mid-50s (55 for Black and 57 for Black). Next, we combine results in Figures 4A and 4B to obtain DDR estimates in Figure 4C. A higher DDR value signifies that, on average, an individual has a higher number of relatives with dementia and relatively fewer working-age kin without dementia.

The age-specific DDR values show a U-shaped pattern, highlighting varying caregiving demands across different age groups. Individuals younger than 25 or older than 60 face higher dementia caregiving demands compared to those aged between 25 to 60. Furthermore, young Black individuals in general experience a greater demand for dementia caregiving compared to their White counterparts, except for those aged 80 and above. While Black individuals show a consistently higher DDR across ages 0 to 80, the racial disparity narrows during middle age and reverses after the age of 80.

In our final analysis, we apply weights to the age-specific DDR based on the age structure of the population. It is well-documented that racial and ethnic minorities in the U.S. tend to be younger than their White counterparts, largely due to differences in fertility and mortality rates. By weighting the DDR using the age structure, we are able to generate a single index number that measures dementia caregiving demand at the population level, taking into account unequal age structures between Black and White populations.

INSERT FIGURE 5 HERE

Figure 5A illustrates the index of the weighted DDR for both Black and White populations from 2010 to 2060. We estimate the DDR by individuals' race and age and apply weights derived from the year-specific population age structure for each racial group to obtain the population-average DDR. Two immediate observations emerge from the results: First, the weighted DDR is projected to increase for both Black and White populations from 2010 to 2060 (footnote: We picked year 2010 as the starting year as population age structure data are not available for earlier years.) Second, the Black population consistently shows a higher level of DDR, and the racial gap in this ratio is also widening over time.

The observed racial gap in the DDR is a joint effect of disparities in both kinship and population structure, as well as differences in dementia prevalence rates between races. To isolate the impact of each contributing factor, we conduct two counterfactual analyses, the results of which are showcased in Figure 5B.

In the first counterfactual analysis, we retained the original differences in kinship structure for Black and White populations but fixed the prevalence rate of dementia for both groups to be the same as White individuals. After this adjustment, the DDR for the Black population notably decreased. From 2010 to 2060, the DDR for Black individuals, under this first counterfactual scenario, remained lower than that of the White population, but the racial gap gradually converged over time.

In the second counterfactual analysis, we assumed that both Black and White populations shared the same kinship structure, specifically that of the White population, while allowing the dementia prevalence rates to vary according to race. The results revealed that applying the White kinship structure to the Black dementia prevalence rate led to an even higher DDR than using the White kinship structure with the White dementia prevalence rate.

The counterfactual analyses yield two key findings. First, they indicate that kinship structure in the White population tends to be older than that in the Black population. This pattern suggests that the familial and kinship network among White individuals is characterized by a higher proportion of older members. This phenomenon may have implications for caregiving, support systems, and family safety net that are influenced by the age compositions of one's close relatives. In other words, the demographic burden driven by births and deaths within families is greater for White families than Black families. Second, the racial disparity in the weighted DDR is primarily driven by the discrepancy in dementia prevalence rates between the racial groups. This pattern suggests that the racial gap in dementia prevalence significantly impacts the overall "burden" caused by dementia on families. Black families face greater need for dementia caregiving despite having a bigger kinship size and younger kin members than White families. Understanding this source of health inequality is crucial for targeted interventions, public health strategies, and policy-making aimed at addressing and mitigating such racial disparities.

DISCUSSION

The caregiving demand for a given individual is influenced not only by the number of family members they need to care for but also by the availability and willingness of other kin to share the caregiving responsibilities. The availability of family caregivers, as well as the number of family members requiring care, is in turn affected by broader demographic transitions that alter the family, kinship, and age structures, coupled with change in cultural norms, social policy, institutional support, and advancements in science and medicine.

In this study, we contribute to the existing literature by investigating the relationship between shifting family demography and future care needs for Black and White older adults in the U.S. across six decades, from 2000 to 2060. We estimated the availability of caregivers, broken down

by race, kin types, and the age of the Focal. Our findings suggest that Black individuals tend to have more children, grandchildren, and nieces/nephews as they age. This advantage of Black is expected to persist, even as the racial gap diminishes, given the declining fertility rates observed in both racial groups. However, our research also revealed a higher prevalence of dementia within Black kinship networks compared to their White counterparts. This elevated prevalence of dementia among Black kinship networks has the potential to counterbalance the advantage of having larger kinship networks among Black individuals as indicated by the index of dementia dependency ratio, ultimately resulting in a greater demand for dementia caregiving within the Black community. Our counterfactual analyses reveal that the Black-White disparity in dementia caregiving demands primarily arises from differences in dementia prevalence rates between racial groups, with the Black kinship structure also having a protective effect. If Black individuals shared the same kinship and age structures as White individuals, the already high dementia caregiving demands within the Black population would be even more pronounced. These findings emphasize the urgency of addressing the racial gap in dementia prevalence rates and increasing public support for extended family members, who are larger in size and have the potential to share the caregiving responsibilities experienced by nuclear families.

Our studies have several limitations. First, we have exclusively focused on biological kin relationships and have not explored stepfamilies and kin from the spouse's side. The complexity and diversity of family, including the definition of who can be considered as family members, are becoming crucial aspects to consider when studying the older adults' support network (Furstenberg 2020; Furstenberg, Harris, Pesando & Reed, 2020; Taylor, Chatters, Woodward & Brown 2013). Another limitation is that we focus on the population average, but demographic patterns can vary significantly across socioeconomic status. For example, individuals with college degrees are more likely to have smaller family networks but are also more likely to be married (Reyes et al., 2021).

However, the influence of educational differences in kinship networks are less pronounced compared to the variation in kinship networks by one's age (Daw et al., 2016). Additionally, our study has primarily concentrated on the differences between Black and White populations, without examining the within-group heterogeneity. For instance, research has revealed variations in family ties, with Black individuals in the South displaying stronger family bonds compared to those in the North (Taylor, Chatters & Cross, 2021). Furthermore, our study is limited to Black and White populations and does not account for other racial/ethnic groups or immigration statuses. Recent studies indicate that immigrant caregivers often engage in more time-intensive caregiving (Rote & Moon, 2018), and caregivers of foreign-born older adults with dementia have reported lower levels of psychological well-being (Garcia et al., 2023). Lastly, while we offer estimates of the available kinship network by kin types, age of the Focal, and race, we did not take into account the actual caregiving provided by kin, whether it be physical, emotional, or financial in nature. Prior research suggests that the positive association between the size of kinship networks and the presence of actual caregivers for adults with activity limitations has a ceiling effect, plateauing at approximately 2 caregivers (Reyes et al., 2021). Future research could examine whether this relationship changes from period to period and over one's life course, considering the composition and size of kinship networks are constantly changing over time and throughout different stages of life.

REFERENCES

Ajrouch, K. J., Antonucci, T. C., & Janevic, M. R. (2001). Social networks among blacks and whites: The interaction between race and age. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 56(2), S112-S118.

Alburez-Gutierrez, D., Barban, N., Caswell, H., Kolk, M., Margolis, R., Smith-Greenaway, E., Song, X., Verdery, A., & Zagheni, E. (2022). Kinship, demography, and inequality: Review and key areas for future development. *OSF Working Paper*. https://osf.io/preprints/socarxiv/fk7x9/

Alburez-Gutierrez, D., Mason, C., & Zagheni, E. (2021). The "sandwich generation" revisited: Global demographic drivers of care time demands. *Population and Development Review*, 47(4), 997-1023.

Barnes, L. L., Mendes de Leon, C. F., Bienias, J. L., & Evans, D. A. (2004). A longitudinal study of Black–White differences in social resources. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 59(3), S146-S153.

Bengtson, V. L. (2001). Beyond the nuclear family: the increasing importance of multigenerational bonds: the burgess award lecture. *Journal of Marriage and Family*, 63(1), 1-16.

Caswell, H. (2019). The formal demography of kinship. *Demographic Research*, 41, 679-712.

Caswell, H. (2020). The formal demography of kinship II. *Demographic Research*, 42, 1097-1144.

Caswell, H., & Song, X. (2021). The formal demography of kinship III. *Demographic Research*, 45, 517-546.

Caswell, H. (2022). The formal demography of kinship IV. *Demographic Research*, 47, 359-396.

Caswell, H., Margolis, R., & Verdery, A. M. (2023). The formal demography of kinship V: Kin loss, bereavement, and causes of death. *OSF Working Paper*. https://osf.io/preprints/socarxiv/mk64p/

Daw, J., Verdery, A. M., & Margolis, R. (2016). Kin count (s): Educational and racial differences in extended kinship in the United States. *Population and Development Review*, 42(3), 491.

Fabius, C. D., Wolff, J. L., & Kasper, J. D. (2020). Race differences in characteristics and experiences of black and white caregivers of older Americans. *The Gerontologist*, 60(7), 1244-1253.

Feng, K., Song, X., & Caswell, H. (2023). The present and future dementia caregiving demand in China: Kinship-based projections and global comparisons. *Paper presented at the 2023 Population Association of America*.

Freedman, V. A., Agree, E. M., Seltzer, J. A., Birditt, K. S., Fingerman, K. L., Friedman, E. M., Lin, I., Margolis, R., Park, S. S., Patterson, S. E., Polenick, C. A. & Zarit, S. H. (2023). The Changing Demography of Late-Life Family Caregiving: A Research Agenda to Understand Future Care Networks for An Aging US Population. *The Gerontologist*, gnad036.

Freedman, V. A., Kasper, J. D., Spillman, B. C., & Plassman, B. L. (2018). Short-term changes in the prevalence of probable dementia: An analysis of the 2011–2015 National Health and Aging Trends Study. *The Journals of Gerontology: Series B*, 73(suppl_1), S48-S56.

Furstenberg, F. F. (2020). Kinship reconsidered: Research on a neglected topic. *Journal of Marriage and Family*, 82(1), 364-382.

Furstenberg, F. F., Harris, L. E., Pesando, L. M., & Reed, M. N. (2020). Kinship practices among alternative family forms in Western industrialized societies. *Journal of Marriage and Family*, 82(5), 1403-1430.

Garcia, M. A., Diminich, E. D., Lu, P., Arévalo, S. P., Sayed, L., Abdelrahim, R., & Ajrouch, K. J. (2023). Caregiving for foreign-born older adults with dementia. *The Journals of Gerontology: Series B*, 78(Supplement_1), S4-S14.

Goodman, L. A., Keyfitz, N., & Pullum, T. W. (1974). Family formation and the frequency of various kinship relationships. Theoretical Population Biology, 5(1), 1-27.

Heuser, R. L. (1976). Fertility tables for birth cohorts by color: United States, 1917-73. US Department of Health, Education, and Welfare, Public Health Service, Health Resources Administration, National Center for Health Statistics.

Hudomiet, P., Hurd, M. D., & Rohwedder, S. (2022). Trends in inequalities in the prevalence of dementia in the United States. *Proceedings of the National Academy of Sciences,* 119(46), e2212205119.

Janevic, M. R., & M Connell, C. (2001). Racial, ethnic, and cultural differences in the dementia caregiving experience: Recent findings. *The Gerontologist*, 41(3), 334-347.

Jiang, S., Zuo, W., Guo, Z., Caswell, H., & Tuljapurkar, S. (2023). How does the demographic transition affect kinship networks?. *Demographic Research*, 48, 899-930.

Kasper, J. D., Freedman, V. A., Spillman, B. C., & Wolff, J. L. (2015). The disproportionate impact of dementia on family and unpaid caregiving to older adults. *Health Affairs*, 34(10), 1642-1649.

Kolk, M., Andersson, L., Pettersson, E., & Drefahl, S. (2021). The Swedish Kinship Universe–A demographic account of the number of children, parents, siblings, grandchildren, grandparents, aunts/uncles, nieces/nephews, and cousins using national population registers. *Working Paper*.

Liu, R., Chi, I., & Wu, S. (2022). Caregiving burden among caregivers of people with dementia through the lens of intersectionality. *The Gerontologist*, 62(5), 650-661.

Matthews, K. A., Xu, W., Gaglioti, A. H., Holt, J. B., Croft, J. B., Mack, D., & McGuire, L. C. (2019). Racial and ethnic estimates of Alzheimer's disease and related dementias in the United States (2015 – 2060) in adults aged≥ 65 years. *Alzheimer's & Dementia*, 15(1), 17-24.

Oyeyemi, D. M., Lin, I. F., Wang, H., Gan, D., Brown, M. J., Freedman, V. A., & Manning, M. (2023). Changes in late-life assistance networks for Black and White older adults during the COVID-19 pandemic. *Journal of the American Geriatrics Society*.

Pinquart, M., & Sörensen, S. (2005). Ethnic differences in stressors, resources, and psychological outcomes of family caregiving: A meta-analysis. *The Gerontologist*, 45(1), 90-106.

Redfoot, D., Feinberg, L., & Houser, A. N. (2013). The aging of the baby boom and the growing care gap: A look at future declines in the availability of family caregivers (Vol. 12). Washington, DC: AARP Public Policy Institute.

Reed, Megan N., Linda Li, Luca Maria Pesando, Lauren E. Harris, Frank F. Furstenberg, and Julien O. Teitler. (2023). Communication with kin in the wake of the covid-19 pandemic. *Socius* 9: 23780231231199388.

Reyes, A. M., Schoeni, R. F., & Freedman, V. A. (2021). National estimates of kinship size and composition among adults with activity limitations in the United States. *Demographic Research*, 45, 1097.

Rote, S. M., & Moon, H. (2018). Racial/ethnic differences in caregiving frequency: Does immigrant status matter?. *The Journals of Gerontology: Series B*, 73(6), 1088-1098.

Roth, D. L., Haley, W. E., Wadley, V. G., Clay, O. J., & Howard, G. (2007). Race and gender differences in perceived caregiver availability for community-dwelling middle-aged and older adults. *The Gerontologist*, 47(6), 721-729.

Roy, S. K., Wang, J. J., & Xu, Y. M. (2023). 2023 Alzheimer's disease facts and figures. *Alzheimer's & Dementia*, 19, 1598-1695.

Sarkisian, N., & Gerstel, N. (2004). Kin support among Blacks and Whites: Race and family organization. *American Sociological Review*, 69(6), 812-837.

Silverstein, M., & Waite, L. J. (1993). Are Blacks more likely than Whites to receive and provide social support in middle and old age? Yes, no, and maybe so. *Journal of Gerontology*, 48(4), S212-S222.

Song, X., & Campbell, C. D. (2017). Genealogical microdata and their significance for social science. *Annual Review of Sociology*, 43, 75-99.

Song, X., Campbell, C. D., & Lee, J. Z. (2015). Ancestry matters: Patrilineage growth and extinction. *American Sociological Review*, 80(3), 574-602.

Song, X., & Caswell, H. (2022). The role of kinship in racial differences in exposure to unemployment. *Demography*, 59(4), 1325-1352.

Song, X., & Mare, R. D. (2019). Shared lifetimes, multigenerational exposure, and educational mobility. *Demography*, 56(3), 891-916.

Spillman, B. C., Favreault, M., & Allen, E. H. (2020). *Family Structures and Support Strategies in the Older Population: Implications for Baby Boomers ASPE Issue Brief*. DC: Urban Institute

Spillman, B. C., Freedman, V. A., Kasper, J. D., & Wolff, J. L. (2020). Change over time in caregiving networks for older adults with and without dementia. *The Journals of Gerontology: Series B*, 75(7), 1563-1572.

Taylor, R. J., Chatters, L. M., & Cross, C. J. (2021). Taking diversity seriously: Within-group heterogeneity in African American extended family support networks. *Journal of Marriage and Family*, 83(5), 1349-1372.

Taylor, R. J., Chatters, L. M., Woodward, A. T., & Brown, E. (2013). Racial and ethnic differences in extended family, friendship, fictive kin, and congregational informal support networks. *Family Relations*, 62(4), 609-624.

Tu, E. J. C., Freedman, V. A., & Wolf, D. A. (1993). Kinship and family support in Taiwan: A microsimulation approach. *Research on Aging*, 15(4), 465-486.

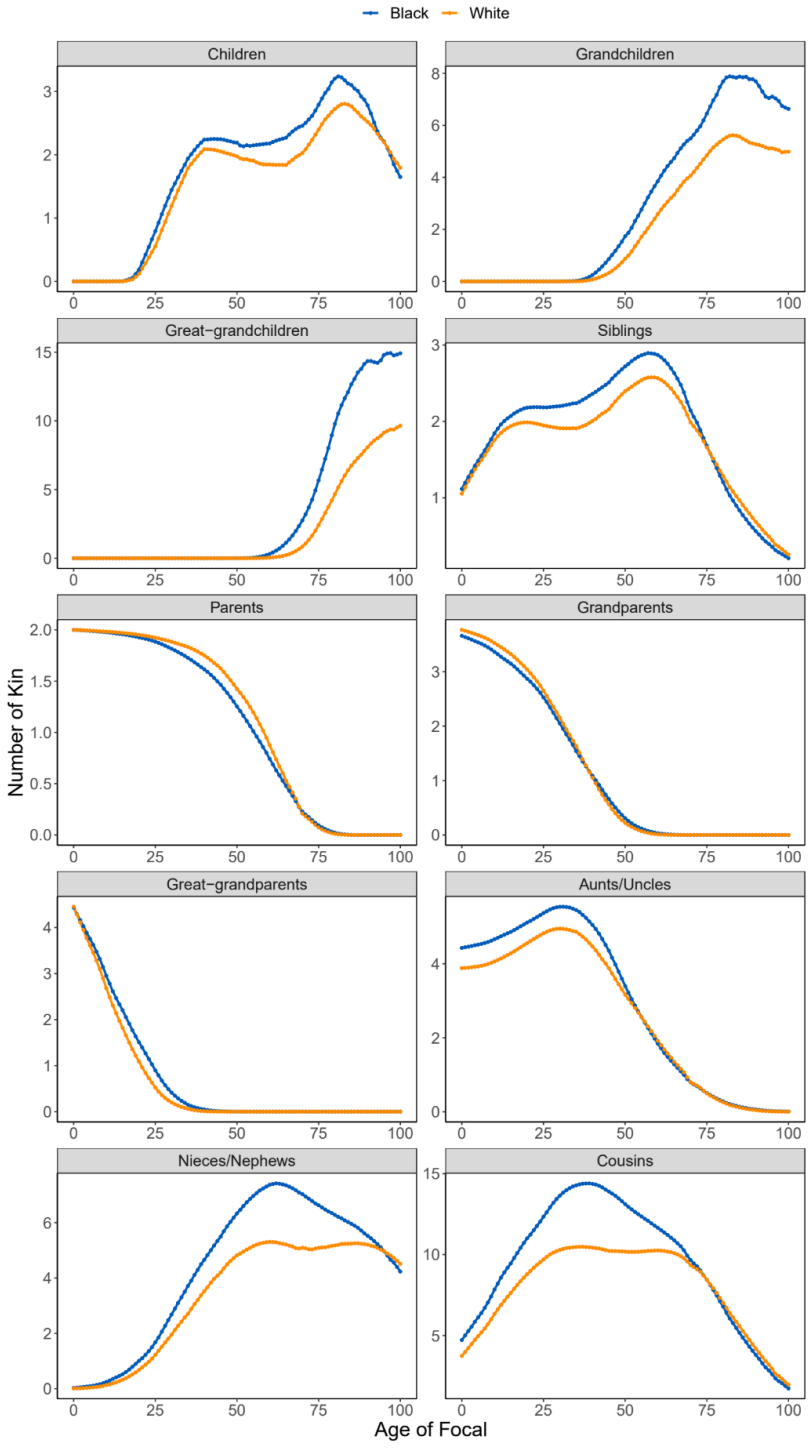
Verdery, A. M., & Margolis, R. (2017). Projections of white and black older adults without living kin in the United States, 2015 to 2060. *Proceedings of the National Academy of Sciences,* 114(42), 11109-11114.

Williams, Iván; Alburez-Gutierrez, Diego; Song, Xi; and Hal Caswell. (2021) DemoKin: An R package to implement demographic matrix kinship models. URL: https://github.com/IvanWilli/DemoKin.

Wolf, D. A. (1986). Kinship and family support in aging societies. *IIASA Working Paper*. IIASA, Laxenburg, Austria: WP-86-081.

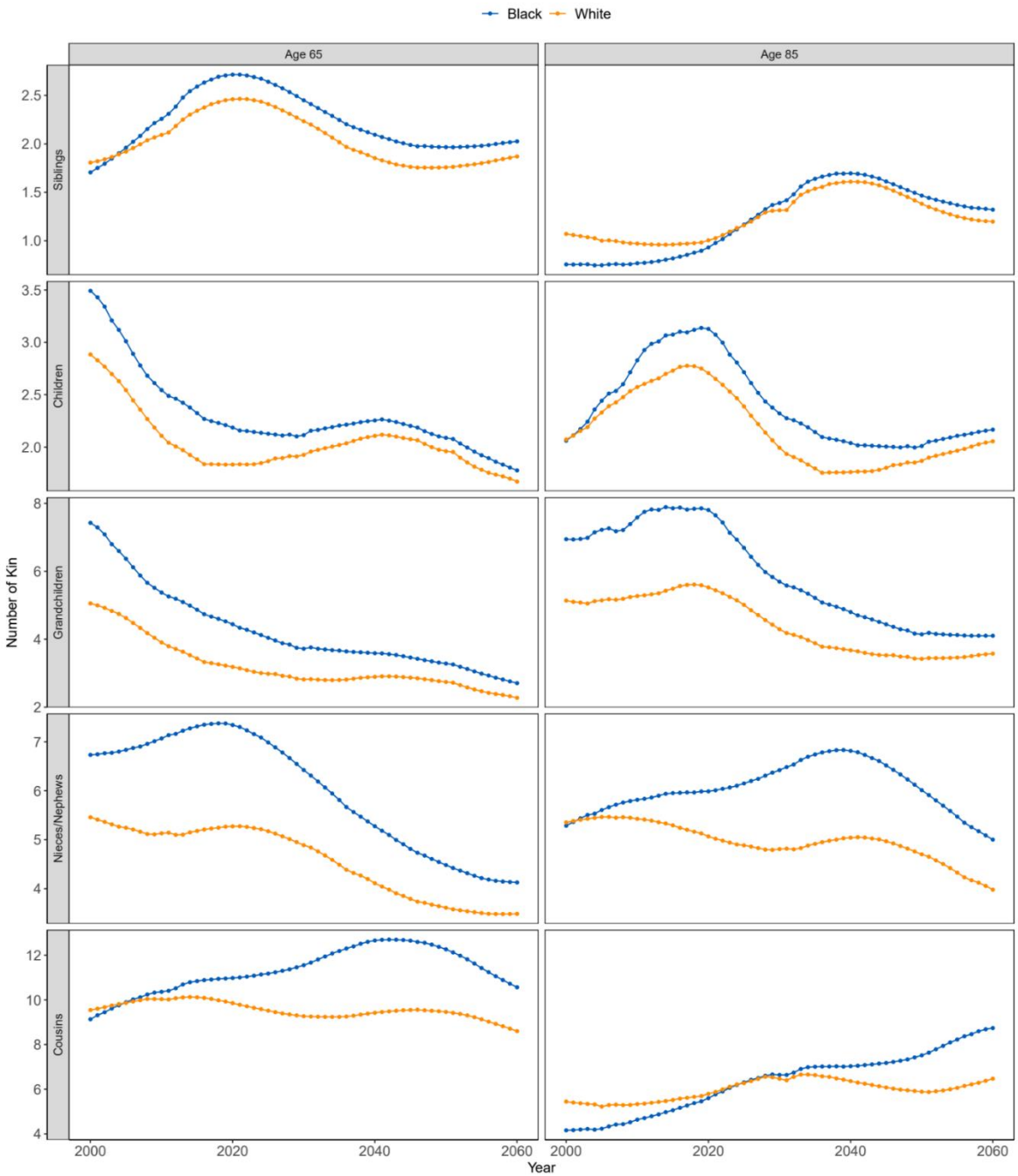
Zhu, Y., Chen, Y., Crimmins, E. M., & Zissimopoulos, J. M. (2021). Sex, race, and age differences in prevalence of dementia in Medicare claims and survey data. *The Journals of Gerontology: Series B*, 76(3), 596-606.

Figure 1 Expected Number of Kin of Various Kinds as a Function of the Age of Focal in 2016



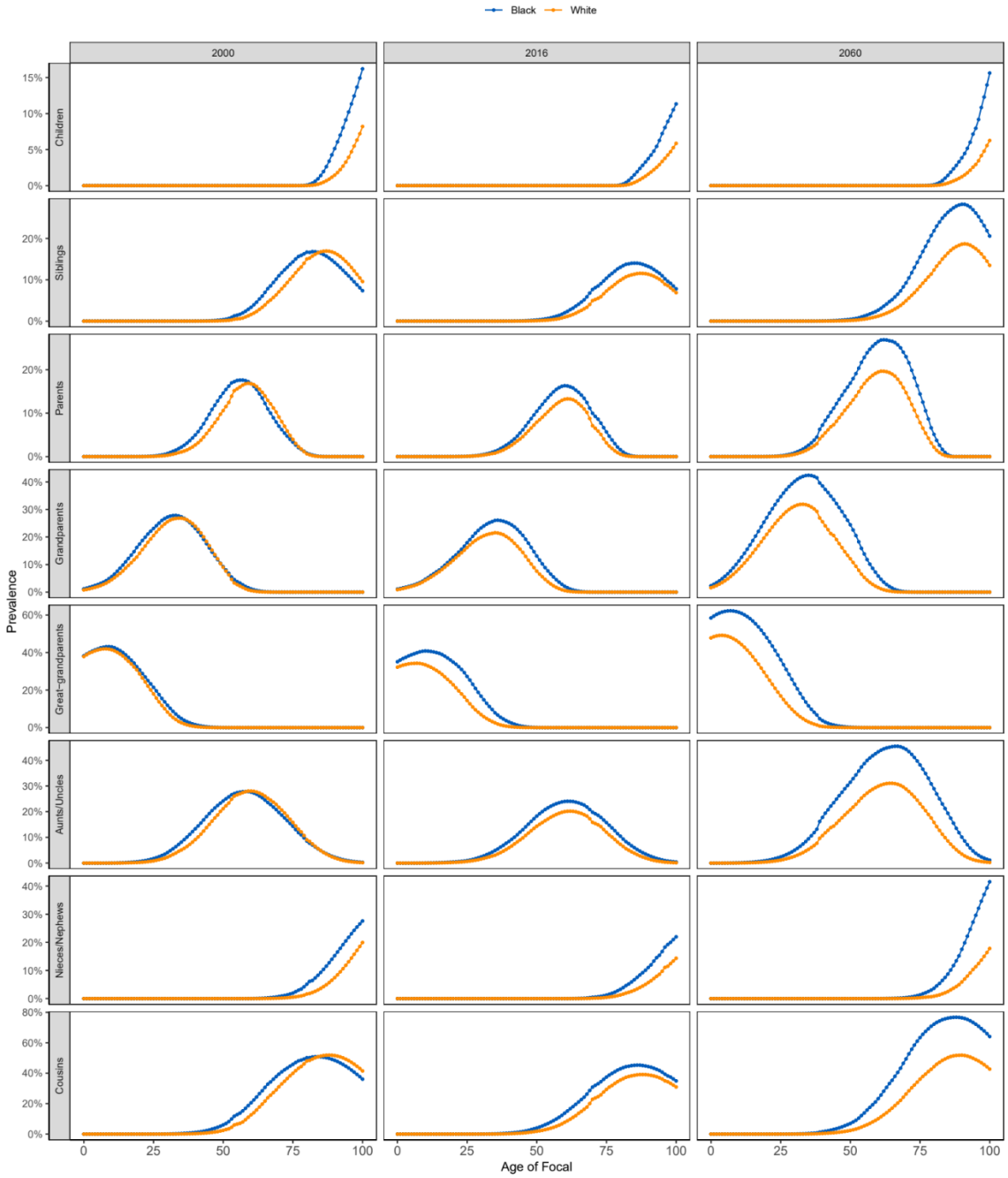
Sources: National Vital Statistics Reports, 1996–2017; Vital Statistics of the United States, 1960–1995; Vital Statistics of the United States (abridged life table), 1946–1959; United States Life Tables and Actuarial Tables, 1939–1941; United States Life Tables for 1900–1902, 1901–1910, 1909–1911, 1919–1921, 1920–1929, and 1929–1931; Fertility Tables for Birth Cohorts by Color: United States, 1917–1980; National Vital Statistics Reports for 2015 and 2018;2017 National Population Projections Datasets

Figure 2 The Changing Expected Number of Kin of Various Kinds for Individuals at the Ages of 65 and 85 by Race from 2000 to 2060



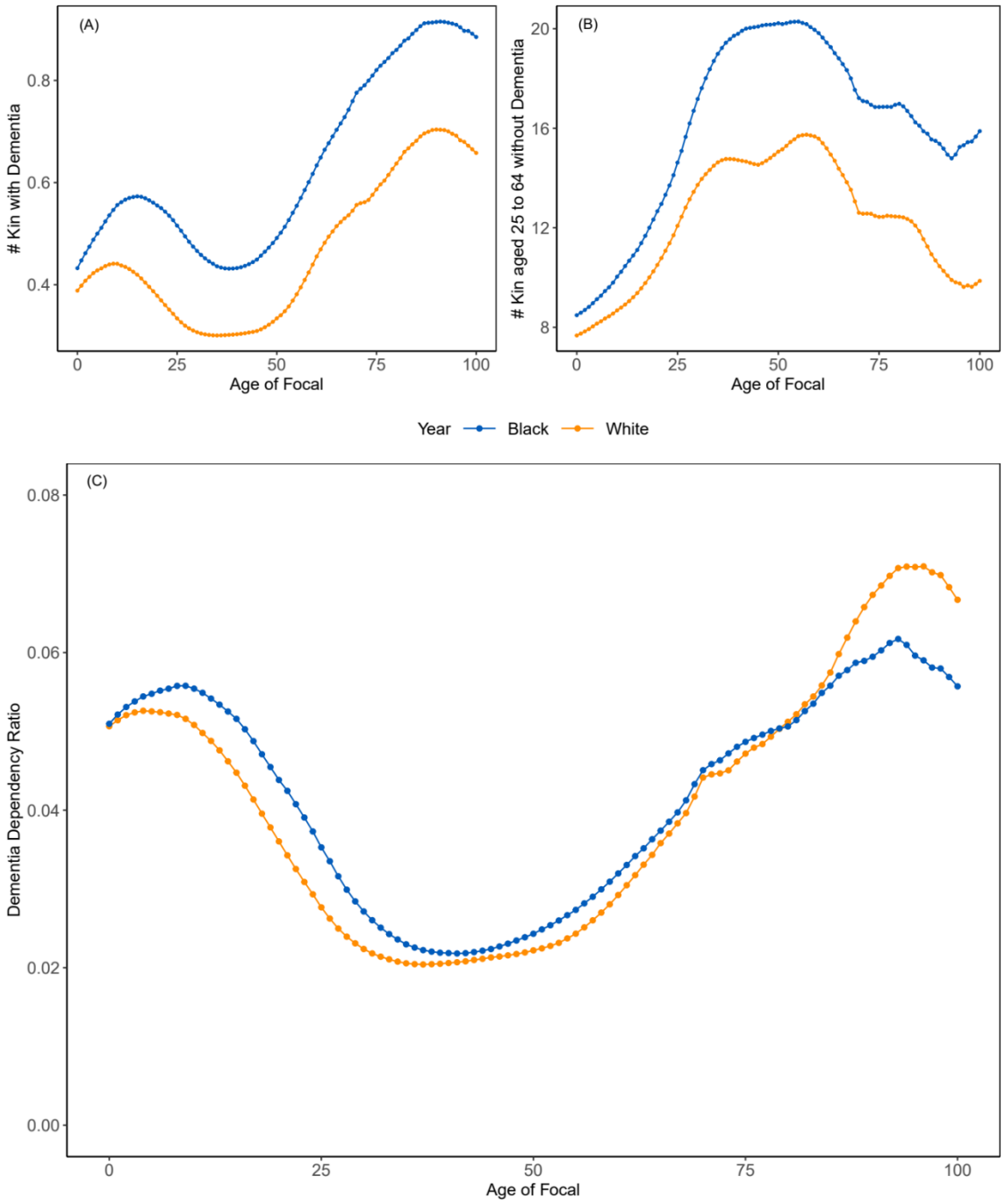
Sources: National Vital Statistics Reports, 1996–2017; Vital Statistics of the United States, 1960–1995; Vital Statistics of the United States (abridged life table), 1946–1959; United States Life Tables and Actuarial Tables, 1939–1941; United States Life Tables for 1900–1902, 1901–1910, 1909–1911, 1919–1921, 1920–1929, and 1929–1931; Fertility Tables for Birth Cohorts by Color: United States, 1917–1980; National Vital Statistics Reports for 2015 and 2018;2017 National Population Projections Datasets

Figure 3 The Prevalence Rate of Dementia for Various Kinds of Kin by Race and Age of Focal in 2000, 2016, and 2060



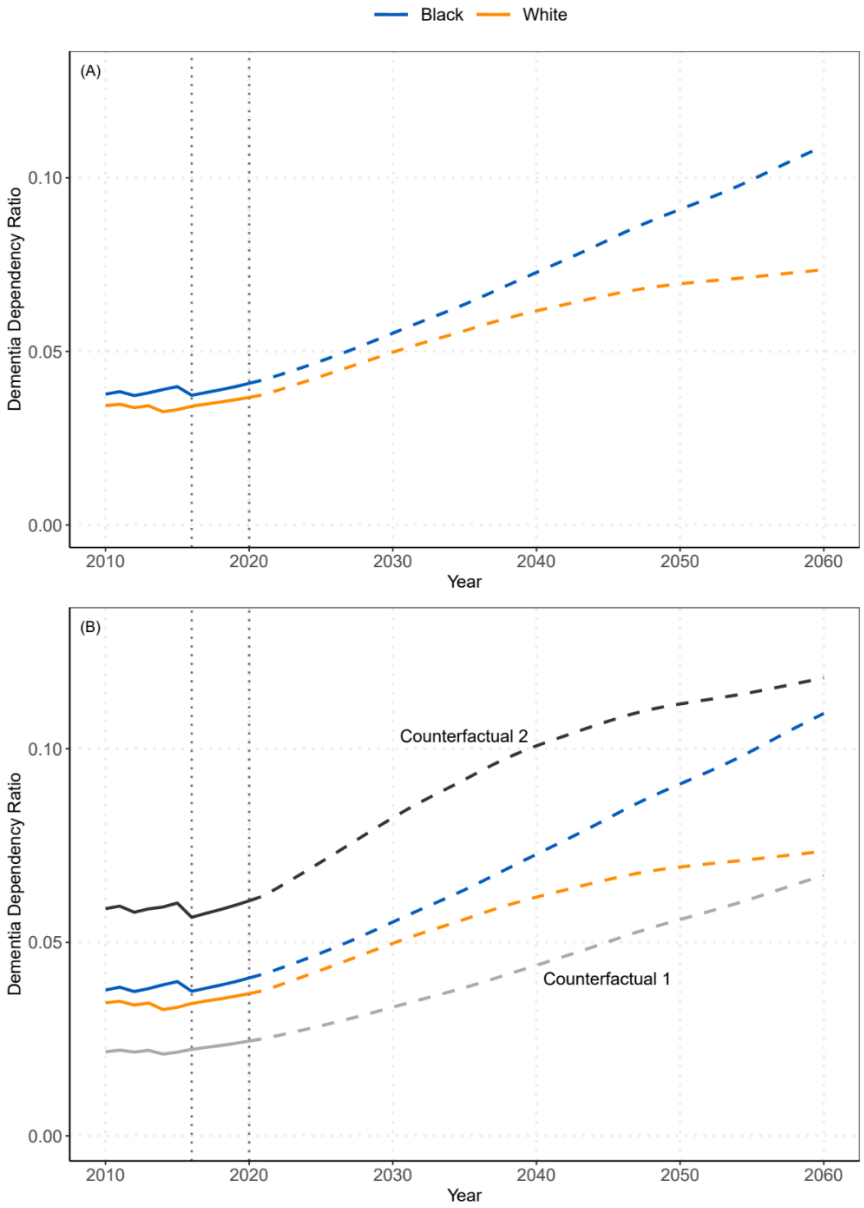
Sources: National Vital Statistics Reports, 1996–2017; Vital Statistics of the United States, 1960–1995; Vital Statistics of the United States (abridged life table), 1946–1959; United States Life Tables and Actuarial Tables, 1939–1941; United States Life Tables for 1900–1902, 1901–1910, 1909–1911, 1919–1921, 1920–1929, and 1929–1931; Fertility Tables for Birth Cohorts by Color: United States, 1917–1980; National Vital Statistics Reports for 2015 and 2018;2017 National Population Projections Datasets; Health and Retirement Study, 2000-2016 (Hudomiet et al. 2022).

Figure 4 (A) The Number of Kin with Dementia by Race in 2016; (B) The Number of Kin Aged 25–64 Without Dementia by Race in 2016; (C) The Dementia Dependency Ratio as a Function of the Age of Focal by Race in 2016



Sources: National Vital Statistics Reports, 1996–2017; Vital Statistics of the United States, 1960–1995; Vital Statistics of the United States (abridged life table), 1946–1959; United States Life Tables and Actuarial Tables, 1939–1941; United States Life Tables for 1900–1902, 1901–1910, 1909–1911, 1919–1921, 1920–1929, and 1929–1931; Fertility Tables for Birth Cohorts by Color: United States, 1917–1980; National Vital Statistics Reports for 2015 and 2018;2017 National Population Projections Datasets; Health and Retirement Study, 2000-2016 (Hudomiet et al. 2022).

Figure 5 Estimated Dementia Dependency Ratio Between 2010 and 2020 and Projected Dementia Dependency Ratio From 2021 to 2060



Note: In Counterfactual 1, we maintained kinship differences but equalized dementia rates to match White individuals. In Counterfactual 2, we equalized kinship structures to the White, but let dementia rates vary by race. After the first vertical dashed line in 2016, dementia rates reflect the observed values observed in 2016. Beyond the second dashed line in 2020, the vital statistics are based on projections.

Sources: National Vital Statistics Reports, 1996–2017; Vital Statistics of the United States, 1960–1995; Vital Statistics of the United States (abridged life table), 1946–1959; United States Life Tables and Actuarial Tables, 1939–1941; United States Life Tables for 1900–1902, 1901–1910, 1909–1911, 1919–1921, 1920–1929, and 1929–1931; Fertility Tables for Birth Cohorts by Color: United States, 1917–1980; National Vital Statistics Reports for 2015 and 2018;2017 National Population Projections Datasets; Health and Retirement Study, 2000-2016 (Hudomiet et al. 2022).