

Kinship Structures for Left Behind Older Adults in High Outmigration Contexts: Evidence From Puerto Rico

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Abstract

Objectives: Migration accelerates population aging in high-outmigration contexts. Older adults who remain in high-outmigration contexts are at higher risk of reduced support networks and increased caregiving burden, but prior work has not quantified how migration influences older adults' kinship structures in such places. This study aims to estimate the kinship structures of older adults living in Puerto Rico and the presence of migrant kin.

Methods: Data come from the United Nations World Population Prospects from 1950 to 2021. We created a 2-sex, multistate, time-variant kinship model to estimate how many and what type of family relationships we can expect for older adults in Puerto Rico and the presence of transnational kin.

Results: Our models suggest that a 65+-year-old living in Puerto Rico will have, on average, 5.6 close biological family members in 2021: 2.8 adult children and 2.7 siblings. These numbers represent a decline since 2000 when 65+-year-olds had 6.7 such kin. Under 2021 demographic conditions, adults 65 years of age are expected to have 69% of their total female close kin and 71% of daughters residing in the United States. The expected number of transnational living kin is greater for 2021 compared with 2000.

Discussion: Models suggest that future generations of older adults in Puerto Rico will have an increased presence of transnational family members. Thus, public health strategies must adapt to address the needs of transnational families in future generations of older adults.

Keywords: Demography of Aging, Kin Availability, Migration, Multistate Models Transnational Networks

Outmigration profoundly impacts the size and composition of kinship networks for those who remain in communities of origin, the so-called “*left-behind*” (Lu, 2012). As working-age adults migrate in search of economic or social opportunities, those left behind—often older family members—experience changes in their kinship networks, social support structures, and caregiving arrangements. Evidence suggests that left-behind older adults' well-being is strongly affected by familial separation and changes in social network structures due to increased social isolation and the absence of instrumental support (Falkingham et al., 2017; M. Antman, 2012; Song et al., 2021). Countries like Mexico, the Philippines, Moldova, and Puerto Rico are experiencing increased migration among younger generations (Angel et al., 2016; Matos-Moreno et al., 2022). Older adults left behind see their social networks reduced and end up with a higher number of transnational family members, leading to disruption in family dynamics (Cojocari & Cupcea, 2018). Understanding these dynamics

is crucial for informing policy and support systems globally in high-outmigration contexts, where similar demographic shifts reshape caregiving and social cohesion. Using Puerto Rico as a case study, we explore how older adult kinship structures have evolved amidst significant outmigration and rapid demographic aging.

Puerto Rico: A High-Migration Society in the Caribbean

Puerto Rico reached its peak population in 2000, with 3.8 million people living in the Caribbean archipelago. Since then, the population has started to decrease, reaching 3.2 million in 2020, mainly due to the outmigration of working-age adults following the onset of the 2005 economic shock and Hurricanes Irma and Maria in 2017 (Matos-Moreno et al., 2021). Over the past 20 years, Puerto Rico has dealt with numerous economic, social, and environmental challenges that constitute push factors for migration to the United States

(Santos-Lozada et al., 2020). This migration is facilitated by Puerto Ricans being recognized as U.S. citizens from birth, leading to limited barriers to migration (Matos-Moreno et al., 2022). The only expenses associated with such a move are those of an airline ticket and any costs associated with relocation, a unique migratory process compared to other Latin American countries (Giorguli-Saucedo et al., 2016). These factors combined with longstanding patterns of historical migration to and from Puerto Rico, have resulted in Puerto Rican enclaves around the United States (Duany, 2011), into a substantial cumulative migration stream. Puerto Rico ranks as one of the top migrant-sending areas by share of its population in the world, with an estimated 1.9 million people born in Puerto Rico living outside of the archipelago in 2020, who mostly live in the United States (United Nations, 2020).

Puerto Rico faces substantial challenges owing to rapid aging resulting from accelerated outmigration of working-age adults (Matos-Moreno et al., 2022). Scholars have coined the term “*aging through compression*” to describe Puerto Rico’s population aging process as the percentage of older adults in Puerto Rico has increased from 13% in 2010 to 21% in 2021. This dynamic pressures older adults’ family networks as they try to meet caregiving and social support expectations (Patterson et al., 2022). Given that most outmigrants from Puerto Rico are working-age adults, current cohorts of older adults face a radically different family network landscape than the historical norms in this island nation (Zsembik & Bonilla, 2000). At the same time, there is a reduction in births, which is tied to historical reductions in fertility levels and births occurring to those who migrated to the US.

Most recently, the impacts of Hurricanes Irma and María in 2017 exacerbated the ongoing outmigration dynamics, leading to more than 100,000 people leaving the island nation in excess of the expected levels based on the 2009–2016 patterns (Santos-Lozada et al., 2020). Although there was a slight return wave in early 2018, this was a short-lived phenomenon as the outmigration from Puerto Rico had resumed by mid-2018 (Santos-Lozada et al., 2020). These demographic dynamics have started to reshape familial arrangements in Puerto Rico, giving rise to transnational families. These migratory patterns, heavily concentrated in working-age adults, present challenges for older adults left behind in Puerto Rico, many of whom can be expected to depend on social support in line with historical social norms and expectations.

Since the 1950s, Puerto Rico has experienced outmigration to the United States, giving rise to settlements in states like New York, Florida, Texas, Connecticut, and Pennsylvania, among others (Duany, 2003). Although less than 2 million people born in Puerto Rico live outside the archipelago, the so-called “Puerto Rican Diaspora,” which includes anyone in the U.S. identifying as Puerto Rican, has grown from 2 million in 1980 to 5.7 million in 2020. The fact that more people of Puerto Rican ancestry live in the US than in Puerto Rico underscores the degree to which transnational families exist for this population. Past research has shown that Puerto Ricans living in the U.S. nourish their connection with family and extended family members residing in Puerto Rico (Duany, 2003). Despite the challenges posed by physical distance, the enduring connections within Puerto Rican transnational families highlight the importance of understanding how global migration trends influence caregiving and support structures.

Transnational Families and Aging

Scholarship on transnationalism around the world stipulates that, despite geographic separation, migrants and their left-behind relatives maintain frequent communication through transnational networks (Verdery et al., 2018) that channel care and emotional support (Ariza, 2014; Toro Adorno et al., 2021), political engagement (Cruz-Malavé, 2022; Portes, 2001; Waldinger & Shams, 2023), and cultural attitudes (Mouw et al., 2014). Although past studies have found proximity affects the existence and/or quality of relations with family members, technological advances have facilitated and increased the interactions and connections between migrants and their left-behind family members (Bacigalupe & Lambe, 2011; Soehl & Waldinger, 2010). Nevertheless, distance still constitutes a barrier to the provision of instrumental support (i.e., chores, cleaning, transportation, etc.), which many older adults with difficulties in daily activities require (Yahirun & Arenas, 2018).

Studies focused on social networks and aging in the United States have found that older adults with smaller networks tend to have a higher risk of developing physical disabilities, depression, and being diagnosed with many chronic conditions (Ali et al., 2018; Patterson & Margolis, 2023). Historically, family size and quality of relationships have been associated with social support provision and caregiving arrangements, all of which have implications for well-being and health. Family support and level of cohesion are essential for the eventual coordination of caregiving when such a need arises (Delgado & Tennstedt, 1997). Concerning older adults, unmet care needs due to restriction of social networks are associated with higher levels of depression and isolation (Bryceson, 2019). This body of scholarship underscores the importance of changes in family or kin networks and older adults’ well-being.

The “family disruption” literature often theorizes that kin migration is similar to other difficult life events, such as divorce, incarceration, or even family death, because it severely disrupts existing ties (Kandel & Kao, 2001; Patterson et al., 2020). Even though the migration of a family member is not the same as the loss of a family tie due to the possibility of remaining in constant communication through technology and other means, left-behind older adult relatives may also be disadvantaged with implications for health and well-being. Past studies have found that older adults who experience the migration of adult children report depression, loneliness, or chronic conditions at higher rates than those with no migrant adult children (Antman, 2010; Knodel & Saengtienchai, 2007).

Despite growing interest in the consequences of family absence for older adults, few studies have attempted to quantify its prevalence in high-migration societies. We estimate the family composition of older adults living in Puerto Rico, with particular attention to the prevalence of transnational ties in their kinship network and how this has changed over the past two decades. No study has estimated the number of living kin for left-behind older adults in Puerto Rico, changes in these patterns in recent decades, nor how transnational ties shape older adult kinship networks. This case study on transnational families, focused on Puerto Rico, provides a model for similar assessments in other high-migration contexts.

Method

We are interested in analyzing the kin ties available to Puerto Rican individuals, breaking those ties into island-based and

transnational ones. To accomplish this, we adopt a two-stage analytic approach that takes advantage of novel demographic techniques for estimating kinship structure. First, we produced a two-sex matrix kinship model that estimates Puerto Rico's population's biological kinship structure without directly modeling migration. This model requires that we have the age and sex composition of the population as well as historical age- and sex-specific fertility and mortality rates so that we can generate population-level estimates of kinship structures. Second, we model the existence of transnational ties by incorporating migration dynamics into that model (see Modeling Kinship and Transnational Ties later). This model requires that we have out- and return-migration rates among those born in Puerto Rico who live either in the archipelago or in the mainland United States. For details on the developed mathematical models, see the [Supplementary Materials](#).

Data

For the first model, we use data from the 2022 United Nations World Population Prospects (UNWPP), from which we obtain age-sex composition as well as age and sex-adjusted fertility and mortality rates over the period from 1950 to 2021. Given the two-sex model structure, we approximated age-specific male fertility to account for reproductive differences by sex ([Schoumaker, 2019](#)).

The second model focuses on kinship structure for females and uses female age-adjusted fertility and mortality rates estimated by the UNWPP for 2000 and 2021. We also used the 2000 decennial enumerations and the 2022 American Community Survey (ACS) to estimate female age-adjusted out-migration rates for Puerto Rico. In 2000, the long-form decennial census and the ACS collected data on place of residence a year before for all respondents. We use these tabulations to estimate out-migration rates by dividing the number of women residing in the United States who reported Puerto Rico as a place of residence in the prior year (i.e., recent out-migrants), by the number of women one year younger living in Puerto Rico in the prior year. We also estimated the return migration rate with a similar approach, dividing the number of Puerto Rican born women in Puerto Rico who reported living in the United States the prior year, divided by the number of Puerto Rican born women one year younger living in the United States the year before. Note that these out-migration estimates restrict our definition of transnational family members in the United States only. Because approximately 99% of those born in Puerto Rico living outside of the archipelago live in the United States ([United Nations, 2020](#)), our estimates are unlikely to underestimate transnational kin considerably in our results.

Modeling Kinship and Transnational Ties

The first model is a two-sex matrix kinship model that projects each kin type linked to its ancestors and descendants in a time-variant framework that does not model migration directly ([Alburez-Gutierrez et al., 2023](#); [Goodman et al., 1974](#)). Through a combination of fertility and mortality matrices parameterized with the United Nations data, this model produces expected values for a member of the population of a specific age (hereafter “focal”) of the age-sex distribution of each kin type for each calendar year.

The second model is a multistate one-sex time-invariant kinship model that accounts for recent outmigration and return migration to estimate the presence of kin migration. The formal demography of kinship models has not yet

developed capable methods to account for the location of kin by two-sex with time-variant demographic rates. Our second model can only estimate the female close kin structure for older adults in Puerto Rico and transnational female relatives for a given year, assuming no change in demographic rates ([Caswell, 2020](#)). Results derived from this model shed light on the effects of high out-migration on female kinship structures and the presence of transnational female kin within older adult family networks under stable demographic conditions.

The model assumes a person could be assigned to three states: (state 1) anyone residing in Puerto Rico in a given year; (state 2) the transition to becoming a Puerto Rican migrant in the US; and finally, (state 3) the return migrant to Puerto Rico for someone assumed to be born in Puerto Rico, migrated and now is back in Puerto Rico. We aim to estimate the number of kin types in state 2; however, it is imperative to add state 3 to the model to account for the probability of Puerto Ricans returning to the island. Note that this model assumes that the 2000 and 2021 fertility, mortality, and migration rates remain unchanged over a very long period. Therefore, the results are not expected to reflect the reality “on the ground” of transnational families in Puerto Rico in those years. Instead, they are intended to reflect the implications of the underlying demographic rates for the population. The interpretation of the results derived from this model is similar to those derived from a period life table; under the specific rates for Puerto Rico in a given year, the expected number of total female kin for a focal age is derived.

Variables

Our analysis focuses on biological close kin: children, siblings, parents, and grandparents. We grouped kin availability estimates by three periods: 2000 (before the economic crisis), 2010 (the first recorded population decline), and 2021 (16 years since the onset of population decline). Our estimates focus on female-focal individuals because women provide the most significant share of informal care and are likelier than men to experience kinlessness in later life ([Alburez-Gutierrez et al., 2023](#)).

Analytic Plan

First, we estimate the number of expected living kin for adults over 55 years old in Puerto Rico for the three periods ([Table 1](#) and [Figure 1](#)). We present the expected number of each kin type and the percent of total kin of each kin type by focal's

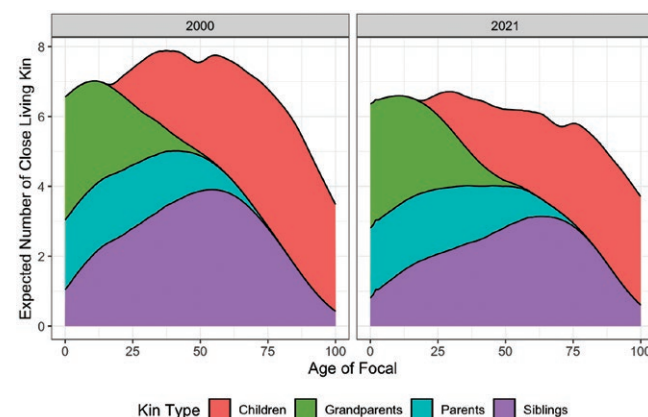


Figure 1. Distribution of expected living close kin for Puerto Rico residents in 2000 and 2021.

Table 1. Number of Expected Living Kin for Adults Over 55 Years Old in Puerto Rico.

Age of focal	Kin type	2000			2010			2021		
		Count	%	Mean age	Count	%	Mean age	Count	%	Mean age
65+	Children	3.8	56.8	46.5	3.4	52.3	47.5	2.8	48.8	48.4
	Siblings	2.8	41.4	71.9	2.9	44.8	72.1	2.7	48.5	73.0
	Parents	0.1	1.5	93.5	0.1	1.9	93.5	0.2	2.7	93.9
	Total	6.7	100.0	—	6.4	100.0	—	5.6	100.0	—
55	Children	3.1	39.3	28.9	2.5	35.7	28.7	2.2	34.9	28.6
	Siblings	3.9	49.9	53.9	3.5	50.9	54.5	3.0	48.2	54.4
	Parents	0.8	9.6	80.3	0.8	12.0	80.4	1.0	15.4	80.0
	Total	7.8	100.0	—	6.9	100.0	—	6.2	100.0	—
65	Children	3.5	47.2	38.4	3.0	43.6	38.9	2.5	40.4	38.8
	Siblings	3.6	48.4	63.2	3.5	50.7	63.6	3.1	51.7	64.3
	Parents	0.3	3.8	88.4	0.3	4.8	88.6	0.4	6.8	88.7
	Total	7.5	100.0	—	6.9	100.0	—	6.1	100.0	—
75	Children	3.9	57.9	46.8	3.4	53.0	48.3	2.9	49.1	48.9
	Siblings	2.8	41.2	72.5	2.9	45.9	72.7	2.9	49.1	73.1
	Parents	0.1	0.7	96.0	0.1	0.9	96.1	0.1	1.4	96.2
	Total	6.8	100.0	—	6.4	100.0	—	5.8	100.0	—
85	Children	4.1	70.2	55.8	3.7	66.2	56.7	3.2	60.5	58.3
	Siblings	1.7	30.0	81.4	1.9	34.3	81.6	2.1	39.5	81.8
	Parents	—	—	—	—	—	—	—	—	—
	Total	5.8	100.0	—	5.6	100.0	—	5.2	100.0	—

Notes: Total close kin is defined as total number of parents, siblings, and children in every focal age. Weighted means are calculated for average number of living kin for 65+ adults using number of adults for single year age groups.

Table 2. Expected Number of Female Kin for a 65-year-old Focal by Location

Kin type	2000						2021					
	PR		US		Total		PR		US		Total	
	#	%	#	%	#	%	#	%	#	%	#	%
Daughters	0.51	51.1	0.48	48.9	0.99	100	0.18	29	0.45	71	0.62	100
Sisters	0.44	50.6	0.43	49.4	0.87	100	0.16	28.6	0.40	71.4	0.56	100
Mothers	0.16	53.8	0.13	46.2	0.29	100	0.14	40	0.21	60	0.35	100
Total	1.11	51.6	1.04	48.4	2.15	100	0.48	31.2	1.06	68.8	1.54	100

Notes: PR = Puerto Rico; US = United States.

age. Second, we estimate the expected number of female kin for a 65-year-old focal by location in 2000 and 2021 (Table 2). Finally, we present the distribution of kin availability for females of all ages in Puerto Rico and the United States for the same periods (Figure 2).

Results

Kin Availability for Both Sexes

Our demographic model of Puerto Rico produces a profile of focal's number of living kin by age and how these numbers change over time. Figure 1 shows the distribution of close living kin through all focal ages for Puerto Rico for 2000 and 2021. The presence of grandparents and parents is more prominent in younger focal ages. As the focal age increases, the presence of grandparents reduces and is no longer present after focal age reaches 50 years. Parents continue to be present in the kinship structures until the focal age reaches

70 years; at this point, their presence is eclipsed by children and siblings who represent the totality of the kinship structure from that point onward. In 2000, we observed how children account for a larger share of the total kin in mid-life and older adulthood. By 2021, the share of children in the kinship network has reduced considerably; the share represented by siblings increased among younger older adults.

Table 1 contains the distribution of expected living kin for a specific focal's age for 2000, 2010, and 2021. For focal aged 65, siblings accounted for approximately half of the total close kin (48.4%) in 2000, which increased in 2021 (51.7%). Most noticeable is the increase observed for focal aged 75, where siblings accounted for 41.2% in 2000 and 49.1% in 2021. A consistent pattern is observed for focal aged 85, where this percentage increased from 30.0% to 39.5% in 2000 and 2021, respectively. In Table 1, we also show the mean age for each kin type. We note an average increase in mean age of approximately two years from 2000 to 2021 for

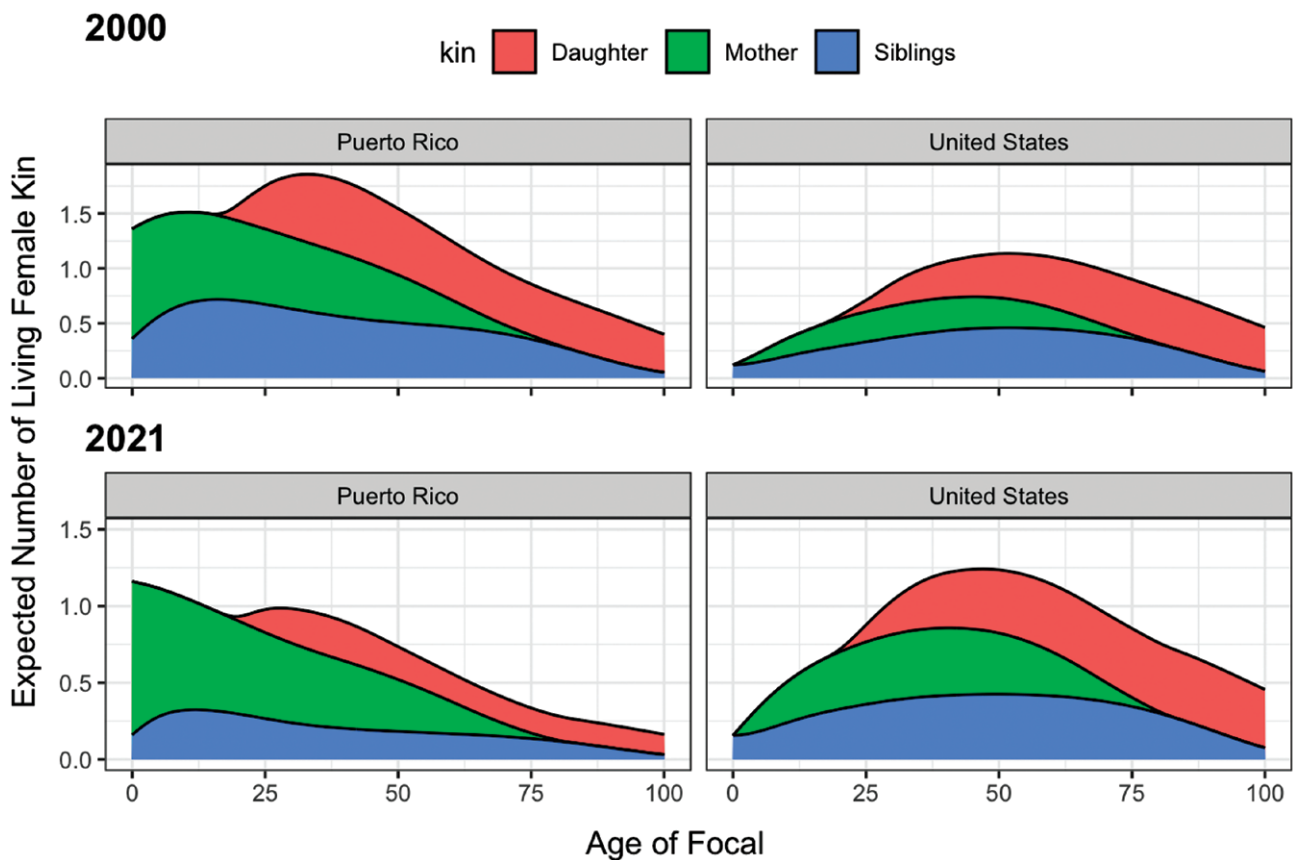


Figure 2. Expected number of female descendants by location between 2000 and 2021.

both children and siblings. This indicates that the model captures patterns of demographic aging observed in Puerto Rico, which results in aging among close kin.

Our primary interest is in the kin ties available to older adults. In Puerto Rico, adults 65 years and older have approximately 5.6 close living kin. Approximately 2.7% of close kin are parents, 48.8% are children, and 48.5% are siblings. Variations in size and structure are observed based on focal age. Siblings are the dominant type of kin for people aged 55 years (48.2% in 2021). However, they represent lower percentages in older ages. Children are the most dominant type of close kin among the oldest-old adults in Puerto Rico. For adults aged 85 years, children represent 61% of their close living kin. These estimates illustrate the dynamics of close kin structures and differences during older adulthood.

In Puerto Rico, kinship structure and size patterns have changed during the first two decades of the 21st century. The total number of living kin consistently reduced from 2000 to 2021 across every focal age (Table 1). For adults 65 years and older, the expected number of total close kin in 2000 was 6.7 and reduced to 5.6 in 2021. For older adults 55 years old, the estimated number of close kin is 7.8 in 2000, reducing to 6.9 and 6.2 in 2010 and 2021, respectively. Although a person aged 55 years in 2021 can expect to have 6.2 close living kin, estimates are lower in older ages, reaching 5.2 close living kin at age 85. This pattern is consistent across time.

From 2000 to 2021, the share of children in the total number of close kin has reduced from 56.8% to 48.8%, a decline that is consistent with focal age. Siblings remained the dominant close kin; the share of siblings/children is similar among

adults aged 55 and 65. For focal adults aged 75 and over, the percentage of the kinship structure represented by children has declined. For a focal aged of 85 years, children represented 70.2% of their close kin network in 2000, and this figure reduced to 66.2% in 2010 and 60.5% in 2021.

Kin Availability by Kin Location

We now explore the results derived from our second model, which focuses on kinship structure and migration. This provides insights into the dynamics of transnational families in Puerto Rico. Note that these estimates refer only to female kin and thus are expected to be smaller than those presented in Table 1. Table 2 presents the estimated number of female kin for a focal aged 65 years in Puerto Rico and the United States. Our model estimates that, on average, a focal female aged 65 residing in Puerto Rico in 2021 has 1.9 living female kin. Based on our estimations, 69% of the living kin are expected to be in the United States. Approximately 71% of the daughters are expected to be in the United States, and daughters constitute the most dominant member of the living female kin type in the kinship structure.

As described previously, migration rates were higher in 2021 than in 2000. In the past, migration was characterized by a circular migration flow that resulted in low outmigration rates. Most recently, we find accelerated migration highly concentrated among working-age adults and substantially lower return migration. Our models indicate that the total female kin decreased from 2.15 to 1.54 close kin between 2000 and 2021. Concerning place of residence, the expected percentage of female descendants residing in the United States has

increased from 47% to 69%. Under the 2000 rates, adults aged 65 were expected to have 48.9% of their daughters living in the US; under 2021 rates, adults of the same age can expect to have 71% of their daughters living in the United States.

When comparing the expected count of daughters, we observe a reduction in the total count and the share of daughters who stay in Puerto Rico for every focal age (Figure 2). Although the patterns observed in Puerto Rico showed the presence of kin in the United States as the focal adult was older under 2000 conditions and a more significant presence of female kin in Puerto Rico, this is no longer the case in 2021. For 2021, we observed a larger share of kin living in the United States than in Puerto Rico. Daughters are mainly present in the United States and not so much in Puerto Rico. Our models suggest that a higher share of transnational members can be expected for older adults; this is also true during midlife as the kin structure and size are more prominent in the United States in 2021 than those estimated for 2000. Altogether, the persistently high migration rates observed after the onset of the 2005 economic crisis have transformed kinship structures. This transformation is evident in our models. Based on 2021 rates, a larger share of Puerto Rican kin are expected to live in the United States, underscoring the transnational nature of family dynamics in Puerto Rico.

Discussion

Older adults in Puerto Rico, as in many other high migration societies, face many challenges, including reducing family size and kin availability. This study finds that biological family size has decreased since 2000 from 6.7 to 5.7 people among adults aged 65 years and older. Kin type availability varies during older adulthood, with children being the most dominant kin type in this period. Siblings have become the most prevalent kin with the reduction of children per family observed in recent times. Given the ongoing migration of working-age adults and reproduction in the host country, transnational families have become more common for older adults in Puerto Rico. For instance, up to 69% of the female close kin can be expected to live in the United States, based on 2021 demographic rates.

Puerto Rico shares several features with other low-fertility societies worldwide, particularly its evolving family structure. The family system is undergoing significant changes, which foreshadows substantial impacts on the older adult population, many of whom expect and depend on family-based care. Due to reduced fertility in previous decades and unprecedented levels of outmigration, older adults have fewer available kin in place and a growing presence of transnational members. This trend is expected to increase isolation and lower social participation among older adults, mirroring patterns in other developed countries (Newmyer et al., 2020). The rapid pace of aging observed in Puerto Rico prevents social institutions from adapting quickly enough. Puerto Rican older adults often report hesitation to use formal support services, such as professional caregivers, and may be unable to afford them. This reduction in family members and unmet support needs can deteriorate their mental and physical health. As the population ages, there is an anticipated rise in cognitive decline and physical limitations, exacerbating the challenges older adults face in finding adequate caregiving and social support.

Even though our findings demonstrate that family size has been reducing since 2000 due to demographic dynamics, the

share of children in the total number of kin is an emerging issue for Puerto Rican older adults. We observe a reduction in family size for older adults consistent with the population reduction in Puerto Rico. Past scholarship has found that a reduction in network size is associated with health deterioration, and reduced support (Margolis & Verderly, 2017). Past studies indicate that Puerto Rican older adults prefer adult children as caregivers more than any other kin type when compared to other ethnic groups in the United States (Hinojosa et al., 2009). Therefore, migration of adult children limits older adults' support capacity in unprecedented ways and could increase levels of depression, loneliness, and reduced social support (Antman, 2010; Song et al., 2021). Because the migration of adult children might not be planned for years ahead, the suddenness of losing an adult child to migration might disrupt older adults' care expectations. Those with fewer adult children might be at a higher risk and vulnerable to a higher effect from separation and an increased probability of unmet needs during old age. The share of children in the total number of close kin among transnational families will continue decreasing to an even lower estimate, and this has implications for older adult's health and well-being of older adults.

Siblings, often overlooked in caregiving studies, play a vital role in supporting older adults, especially in high-migration contexts where adult children may be absent. They offer emotional and practical support, such as help with daily tasks and caregiving, often sharing similar life experiences that enhance their ability to provide care. Research shows that sibling involvement can alleviate caregiving stress, promote emotional resilience, and improve well-being for both caregivers and recipients (Baldassar & Brandhorst, 2021). Siblings' caregiving has been linked to better health outcomes, such as longer disability-free life expectancy and enhanced psychological well-being (Lee & Kim, 2022). Moreover, sibling caregivers tend to experience less mental health strain than other caregiving groups, making them a valuable but underexplored support network (Namkung et al., 2016; Viana et al., 2013). Given their prominence in kinship networks, even in the context of increased migration like Puerto Rico, studying sibling caregiving can offer crucial insights into how families adapt to the challenges of migration and aging.

Intergenerational housing has been proven to buffer the effects of feelings of loneliness, alleviate the burden of financial responsibilities, and offset the effects of familial separation and social network reduction on the well-being of older adults. About 26% of older adults report living alone in Puerto Rico (U.S. Census Bureau, 2019). Although older adults living alone do not necessarily translate into loneliness or difficulties in receiving support, evidence suggests that intergenerational residence and interaction increase the likelihood of Puerto Rican older adults receiving support with a more significant impact among women due to their ability to keep roles and stronger emotional bonds with their children across the life course (Quashie et al., 2022). Intergenerational co-residence facilitates the provision of support between older parents and their adult offspring. The immediate availability of human interaction and instrumental support decreases the risk for several chronic conditions and physical disability. For example, places like Bridge Meadows and Humanitas, among others, have improved older adults' lives through intergenerational interaction (Somers et al., 2024; Wise, 2024). These communities encourage the participation of young adults and older adults in everyday responsibilities, creating a sense of

belonging for their participants. Furthermore, social participation among older adults also increases a sense of purpose and belonging in a community, factors that are associated with health and well-being. Future research on transnational families and health needs to explore the benefits of various living arrangements and how they offset the effects of familial separation in older ages within high-migration contexts.

Transnational families are not a foreign concept for Puerto Rican older adults. Since the 1960s, outmigration has transformed family dynamics. Research has found that migrant family members retain ties to the island through constant communication. However, total family size or in-island available kin can buffer the effect of losing children to migration. For example, a woman in 1960 was expected to have five children throughout her lifespan, if one of those children became a migrant, she would still have four children in Puerto Rico. On the other hand, with an average of children 1.2 per woman in 2021, outmigration substantially affects future kin availability for older adults (United Nations, 2019). The combination of migration and low fertility present challenges for the quality of life of older Puerto Ricans. However, these challenges are complex only because established institutions and policies typically provide minimal support and expect families to assume caregiving responsibilities. Further, the instability brought about by the coronavirus disease 2019 (COVID-19) pandemic significantly halted migration temporarily due to the travel limitation mandates and increased mortality. Past studies on the impact of mortality have quantified the reach of one COVID-19-related death in family networks. This is accomplished by estimating how many people are bereaved after a COVID-19-related death (Verdery et al., 2020). We argue that the impact of the COVID-19 pandemic on transnational family networks is an area that warrants further examination. Public health and social services systems must rethink the concept of care and support for older adults without close kin in Puerto Rico. The role of the Puerto Rican diaspora in caregiving dynamics is also a subject that warrants further attention.

Families have developed various strategies to adapt caregiving practices in countries like Mexico and the Philippines, where migration to the United States is a common pattern. In the Philippines, family members in the diaspora often send remittances to support caregiving for older parents or arrange for other relatives, like siblings or extended family, to provide direct care. Some studies have shown that these transnational arrangements can help mitigate older adults' emotional and economic strain, even though they often fall short concerning in-person care (Bacigalupe & Lambe, 2011; Verdery et al., 2018). In Puerto Rico, similar patterns are emerging, with migrants sending remittances to older relatives or coordinating care with local community organizations. These arrangements, however, are not without limitations, as the absence of physical presence can result in a lack of instrumental support for older adults with severe health limitations or disabilities (Yahirun & Arenas, 2018). The recent experiences with Hurricanes Irma and María, along with their impact on pre-existing migration dynamics, highlight the role of climate-related migration in reshaping families and their dynamics, not only in Puerto Rico but also worldwide.

Limitations

As shown, kinship models have the potential to reveal the complexities of transnational families. However, they are not without limitations. First, our multistate model assumes

fertility to be the same for Puerto Rican women, independent of location. Although we understand that fertility behaviors at the individual level are affected by social context, acculturation, and family settlement in new locations, we are limited in the availability of data on Puerto Rican migrant fertility rates in the United States. Second, these models focus on modeling the biological kin of older adults, leaving behind other definitions of familial ties beyond the bloodline. The definition of family goes beyond biological kin when considering social ties, support, and care. Older adults not only rely on adult children for their support or care but in many cases, in-laws or friends take on responsibilities commonly assigned to them. However, these models efficiently estimate the changes in familial composition that commonly cause the redefinition of care practices and social support for older adults aging in place. Third, although time-variant two-sex kinship models account for variation in demographic rates, at this time, multistate models cannot estimate two-sex kinship structures accounting for the location of kin. More work is needed to develop multistate kinship models incorporating two-sex and time-variant demographic rates.

Conclusions

This study expands our understanding of transnational families by exploring how migration alters close kin availability. Using Puerto Rico as a case study, we found that close kin is reducing, and out-migration further intensifies this reduction. When migration is considered, older adults in Puerto Rico can expect most of their close kin to live in the United States, their role in providing support warrants further examination. Our estimates indicate that the age of the close kin is also increasing. Policy interventions are warranted to address the needs of older adults left behind, who lack close kin due to migration resulting in increased unmet needs. Identifying and understanding the presence of transnational families is the first step to developing policies aimed at supporting aging in place within high outmigration contexts.

Supplementary Material

Supplementary data are available at *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences* online.

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Conflict of Interest

None.

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Author Contributions

A. M.-M. planned the study, performed all statistical analysis, and wrote the paper. D. A.-G. and I. W. supervised the data analysis and contributed to structuring and revising the paper. A. M. V. and A. S.-L. contributed to planning the study and revising the paper. M. F. S. contributed to developing the study's framework and revising the paper.

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