Linking Kin Networks and Mortality in the Context of the U.S. Demographic Transition

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Short Abstract

Increasing longevity and reduced fertility have led to extended kin networks with more living vertical ties (e.g. grandparents) and fewer living horizontal ties (e.g. siblings) than in the past. Yet how kinship networks change over time and link to mortality patterns has been dramatically understudied in high-income countries. In this paper, I use a novel genealogical data set containing 2 million individuals to trace changes in kinship network sizes and kin relation types (i.e. great-grandparents and cousins) and their influence on infant mortality across the U.S. demographic transition from 1750-1950. I describe kin relations alive in the year of birth for 10-year cohorts as the demographic transition unfolds. Then, I extend the literature linking kin support to infant mortality by examining the influence of more extended vertical ties (i.e. aunts, uncles, great-grandparents) as well as nuclear and extended horizontal ties (i.e. siblings and cousins) on infant mortality over time.

Extended Abstract

Only a few studies have sought to tabulate the frequency of kin relations in the U.S., with interesting results. For instance, scholars have found that cohorts born in 2000 are almost three times as likely to have all grandparents alive at birth compared to cohorts born in 1900, and that more recent cohorts are much more likely to have parents and spouses alive at middle and older ages (Uhlenberg, 1996). Others have found that the types of kin to which one is exposed changes over the life course, and that there are marked differences in kin counts between racial and educational subgroups (Daw, Verdery, & Margolis, 2016). However, data limitations have made it difficult to study changes in extended kin relationships (e.g. cousins, aunts, uncles, etc.) over time, particularly in the context of demographic transitions, as well as the influence of extended kin on mortality, and infant mortality in particular.

Two theoretical frameworks can be used to generate hypotheses as to the influence of kinship networks on infant mortality. The first is an evolutionary anthropology perspective, which puts forth the 'grandmother hypothesis' wherein the uniquely human pattern of long lifespans among females after menopause is explained as an evolutionary adaptation to enhance the reproductive success of daughters (Hawkes, O'Connell, Jones, Alvarez, & Charnov, 1998). In this way, grandmothers can enhance their genetic contribution to subsequent generations, particularly via the maternal line (Fox et al., 2009). A corollary to this hypothesis, then, is the expectation that presence of grandmothers will protect against infant mortality. Indeed, studies have frequently, but not always, shown the importance of availability of grandmothers, particularly maternal grandmothers, for infant health and survival (Jamison, Cornell, Jamison, & Nakazato, 2002; Sear & Mace, 2008; Sear, Steele, McGregor, & Mace, 2002).

Thus, my first question is – do we find evidence that is supportive of the 'grandmother hypothesis' in the United States and did the evidence change over the course of the demographic transition? Secondly, the 'grandmother hypothesis' tends to overlook the incentives great-aunts and aunts may have in their nieces' survival, given that they also share genetic material. Moreover, kin networks that include a greater number of extended kin have been shown to generate more support for mothers and children, resulting in healthier children (Shawn Malia Kana et al., 2005).Thus, I also aim to explore whether other extended vertical ties influence infant mortality.

The second theoretical framework derives from the new home economics literature. Becker (1960) argued that parents are faced with a quantity-quality tradeoff with regard to their children. With income being fixed, parents can choose to have a higher number of children in whom they invest relatively fewer resources or a lower number of children in whom they invest relatively more resources. This theory implies that higher sibship sizes would equate to fewer relative resources per child. Competition for scarce resources, such as adult attention or food, would increase as number of siblings grows, potentially leading to negative outcomes for children. For instance, if adults are distracted with the care of several other children in a household, they might find it more difficult to prevent accidents among younger children. Some evidence does suggest that higher sibship sizes are associated with higher infant mortality rates (Knodel & Hermalin, 1984). However, other work suggests that older siblings that can act as caretakers can have beneficial effects on children (Sigman et al., 1988).

Thus, I also aim to investigate whether a higher number of siblings is tied to increased infant mortality and whether gradations of age of siblings matters. Further, I combine the implications of the 'grandmother hypothesis' with the implications the quantity-quality tradeoff hypothesis to ask whether extended horizontal ties (i.e. cousins) influence and interact with vertical ties to influence infant mortality outcomes. For example, grandmothers' resources would likely be divided among a much higher number of grandchildren than parental resources among children.

Data

To generate kin counts and analyze mortality rates by kin type and kin count, I use the Familinx genealogical database, a novel dataset compiled from publicly available genealogical records from geni.com. The Familinx database contains demographic information (gender, birth/death year, birth/death place, etc.) on over 43 million individuals worldwide, of which over 12 million are lineage 'founders' with no parent information. The data set enables the study of extended kin relations not typically found in other data sets, including great-grandparents, grandparents, aunts, uncles, and cousins. I narrow my sample to only persons who were born/baptized or died/were buried in the United States. I substitute missing birth year with baptismal year and missing death year with burial year to enhance my sample size with birth and death data, which totals approximately 2 million observations.

A potential drawback of the Familinx database is its non-representative nature. Persons that publicly compile their family trees are likely to be of higher educational and socioeconomic status, as compared to the full population of the United States; to the extent that SES is transmitted multigenerationally, lineages documented may be similarly selected. Additionally, family trees are unlikely to be complete, with more distant kin likely to be underreported. To address this concern, I conduct a more historic analysis. Earlier born cohorts are better represented in the data, likely because there are multiple descendants tracing their lineage back to the same ancestors. This leads to a process of cross-checking and elaboration of the lineage that enhances data reliability. To further estimate data reliability and validity, I will compare birth cohort sizes and characteristics to available vital statistics. Finally, even if raw kin count numbers are skewed by underreporting, as long as they are similarly skewed for each cohort, the inter-cohort comparison of extended kin networks is likely to remain informative.

Analysis

I will measure the number of kin alive using simple frequency counts, and will parse by kin type. Then, I will use a retrospective case-control design to assess whether infants that died in their first year of life were more likely to have different numbers and types of kin relations as compared to infants that did not die in early life, and comparing other confounders between the two groups, such as birth spacing, the average length of a generation, birth order, and parental birth order.

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