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Isaac Sasson, Linus Andersson, Alyson van Raalte
and Diego Alburez-Gutierrez



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Isaac Sasson^{1,2*}, Linus Andersson³, Alyson van Raalte⁴, Diego Alburez-Gutierrez⁴

¹ *Tel Aviv University, Israel*

² *Stockholm University, Sweden*

³ *University of Turku, Finland*

⁴ *Max Planck Institute for Demographic Research, Germany*

Abstract

The death of family members is a near-ubiquitous human experience that profoundly impacts social and psychological wellbeing. Mortality decline in high-income countries has made this experience more predictable across the life course, yet family bereavement patterns vary across socioeconomic strata. This study proposes a demographic framework for understanding how the interplay of mortality inequalities and variation in kinship structure shapes inequalities in bereavement. Drawing on life course theory, it conceptualizes the burden of bereavement as a multifaceted phenomenon relating to cumulative exposure to kin deaths (intensity), when these deaths occur during the life course (timing), and whether they follow the generational ordering (predictability). Using Swedish registry data, the study reconstructs four-generation kinship networks around the 1973 birth cohort and estimates the burden of bereavement by education and income. Inequalities in bereavement are decomposed to differences in kin mortality and structure. The findings reveal a socioeconomic gradient in family bereavement, mainly in timing and predictability effects. Individuals with lower socioeconomic status experience the death of parents, siblings, cousins, and children earlier in life. Disparities in cumulative exposure to bereavement are largely offset by differences in kin structure. This study underscores how demographic processes shape inequalities in bereavement across the life course.

Keywords: Family bereavement, kinship demography, mortality, inequality, socioeconomic status, grandparents.

* Corresponding author: isasson@tauex.tau.ac.il

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Introduction

An average Swede born in 1780 could expect to live to age 36, and over one third of newborns did not survive to the age of ten; a mere one century and a half later, life expectancy at birth doubled and over one half of the 1930 birth cohort would live past the age of 80 (Human Mortality Database, 2022). What once was the exception—survival to old age—is now the rule. This pattern is hardly unique to Sweden. As a result of the rapid mortality decline since the industrial revolution, death in many societies is now seen as both predictable and orderly (Bayatrizi, 2008). We expect death to occur in old age and children to outlive their parents. We can also expect to know our grandchildren. For example, if at the turn of the 20th century the average American could expect to live five years concurrently with any of their grandchildren, toward the end of the century this figure would increase sevenfold (Song & Mare, 2019).

Yet, the prospects of growing old and confidence regarding the future are not equally shared by all social groups. Although life expectancy at birth more than doubled in high-income countries during the mortality transition, significant disparities in length of life persist across subpopulations within nations. Studies have consistently found that, on average, lower socioeconomic strata and disadvantaged minority groups have both shorter and more variable lifespans (Brown et al., 2012; Firebaugh et al., 2014; Sasson, 2016; van Raalte et al., 2011). As a result, individuals belonging to lower socioeconomic strata may also be more likely to experience the death of family members and peers who share similar characteristics and social environments.

Social epidemiologist Richard Wilkinson provides a useful illustration linking aggregate demographic phenomena and how they are experienced by individuals (Wilkinson, 2002, p. 57):

“Perhaps the easiest way of seeing intuitively what the socioeconomic differences in death rates mean, is to imagine two people, each with a similar-sized circle of friends and relations [...] but living in separate rich and poor areas. For every death that occurs among the circle of friends of the person in the rich area, the person in the poor area will know of two, three or even four times as many deaths among his or her circle of friends.”

Indeed, mortality rates that are two, three, or four times higher in one social group compared to another are not unheard-of in contemporary high-income countries (Marmot, 2003). Yet, whereas numerous studies have documented the persistent and rising class-based inequalities

in mortality, relatively few have considered the impact of those inequalities on differential exposure to family bereavement (Fletcher et al., 2013; Patterson et al., 2020).

Intuitively, one might expect that social inequalities in family bereavement will resemble those in mortality. However, socioeconomic strata also vary in their fertility, marriage, divorce, and remarriage rates, which in combination impact the number of familial ties, both consanguineal (blood relationship) and affinal (by marriage), as well as generational length. As a result, individuals from different socioeconomic strata differ in kinship size and in their exposure to kin at different ages, in addition to mortality (Andersson & Kolk, 2023). The net effect of socioeconomic status on exposure to family bereavement is therefore difficult to predict.

In order to address this gap, the present study proposes a comprehensive demographic framework for understanding how the interplay of mortality inequalities and variation in kinship structure shapes inequalities in bereavement. Our framework aims to clarify the role of countervailing demographic forces shaping the burden of bereavement: how many times kin loss is experienced, the timing in which it occurs across the life course, and how predictable is the loss with respect to generational ordering. We apply this framework to Sweden, a post-demographic transition, aging population in which socioeconomic inequalities in mortality have been on the rise for several decades (Bengtsson et al., 2020). Using complete population data, we reconstruct four-generation kinship networks surrounding the 1973 birth cohort and enumerate the number of kin deaths, by type of relation, from birth through midlife. This study uniquely covers the entire kinship universe to cover the death of grandparents, parents, aunts and uncles, in-laws, spouses and childbearing partners, siblings (including half-siblings), children, and nieces and nephews. For each type of family tie, we estimate the burden of bereavement by education and income levels. Lastly, we decompose socioeconomic disparities in family bereavement across the life course to differences in kin age-structure and differences in kin mortality. We conclude by discussing the theoretical implications of social disparities in family bereavement at the intersection of kinship demography and mortality inequalities.

Theoretical background

Social inequalities in family bereavement

The loss of a family member constitutes a stressful life event that is often accompanied by psychological distress (Anderson et al., 2022; Denckla et al., 2022; Fletcher et al., 2018) and transition into new social roles or out of old ones (e.g., caregiving) (Aneshensel et al., 2004).

Sociological perspectives on bereavement have emphasized the wider social context in which it occurs, its relation to different stages of the life course, and how the experience of bereavement intersects with class, gender, and race/ethnicity (Carr, 2018; Thompson et al., 2016). Critical to coping with bereavement, as well as its long-term impact, are the timing in which it is experienced during the life course (Carr, 2004, 2020) and whether the death of a family member was anticipated or not (George, 1993; Hagestad, 1996). Experiencing “off-time” deaths, such as the loss of a child by a parent or a spouse by early midlife appear to have longer-lasting effects on psychological distress and wellbeing (Sasson & Umberson, 2014; Umberson & Donnelly, 2022). Thus, in order to characterize social inequalities in family bereavement adequately, the experience of bereavement has to be understood as a multifaceted phenomenon relating not only to the number of deaths in the family, but also to the type of relationship, the timing in which loss is experienced during the life course, and whether it follows the expected generational ordering. Social inequalities in bereavement are a particularly poignant case given that socioeconomic status is correlated across generations. The experiences of bereavement from the perspective of an individual of a given socioeconomic status will reflect, partly, socioeconomic disparities in mortality as well as intergenerational correlates of socioeconomic status and demographic behavior.

In spite of the ubiquity of bereavement as a human experience, we have a limited understanding of how demographic factors shape exposure to bereavement in extended family networks. Even less is known about how this exposure varies across social groups and over the life course. While there is a long tradition of demographic research on mortality inequalities, few studies have considered their impact from the perspective of the bereaved, rather than the individual being exposed to the risk of mortality. Only in recent years have studies focused on bereavement patterns according to the individual characteristics of the bereaved, including the age at which one experiences death in the family, the relationship to the bereaved, and the cumulative exposure to kin mortality (Alburez-Gutierrez et al., 2021; Kim et al., 2021; Smith-Greenaway et al., 2021; Umberson et al., 2017; Verdery & Margolis, 2017).

Prior research in this area can be broadly divided into two approaches. The first approach consists of survey-based, empirical studies comparing the risk of losing a family member across social groups. Studies based in the US, for example, have found that black Americans are three times more likely than white Americans to experience the death of a parent by the age of 10 (Umberson et al., 2017), and that they are also more likely to experience the death of other family members by mid-life (Donnelly et al., 2020). Other research in this vein

has found that the death of a sibling during childhood is more common among families with lower household income (Fletcher et al., 2013), and that US-born Hispanics are more likely to lose a child throughout adulthood than are non-Hispanic whites (Donnelly et al., 2023). Studies in this tradition, however, have tended to focus on dyadic family relations (risk of losing a spouse, child, etc.) without explicit consideration of other demographic factors such as family structure and complexity.

The second approach consists of studies employing either formal demographic models of kinship or micro-simulation, offering a comprehensive breakdown of how demographic factors shape the experience of death within family networks (Alburez-Gutierrez et al., 2021; Caswell & Song, 2021; Smith-Greenaway et al., 2021). For example, a microsimulation study estimated the number of older US adults without living kin by race (Verdery & Margolis, 2017). A model-based study found that, since 1999, black children in the US have had an increased burden of parental deaths from firearms and drug poisoning (Schlüter et al., 2024). Recent studies on the Covid-19 pandemic have estimated that every Covid death in the US bereaved nine extended-family members (Verdery et al., 2020), leaving hundreds of thousands bereaved (Snyder et al., 2022). This average, however, masked a disproportionately higher burden of bereavement among black, Latino, and less educated communities (Andrasfay & Goldman, 2021; Clouston et al., 2021). Yet with few exceptions (Patterson et al., 2020), this literature has relied on aggregate demographic parameters rather than on individual microdata. Much like Wilkinson's stylized example above, this approach assumes that different subpopulations follow a historical or projected set of central demographic rates. As a result, it does not capture the socioeconomic and ethnic heterogeneity that may lie within families.

Our study is intended to bridge the two approaches by estimating how bereavement patterns vary in real populations using microdata on four-generation kinship networks in Sweden. In addition to social disparities in kin mortality, our approach accounts for variation in kinship structure.

Why the demography of kinship matters

The burden of bereavement depends not only on mortality levels, but also on a host of additional demographic characteristics which shape exposure to kin of varying ages (e.g., fertility, family size and complexity) (Coresh & Goldman, 1988; Goodman et al., 1974). Over the course of the demographic transition, families have become smaller as lives have been extended and fertility declined. As a result, the kinship network structure itself has changed in many societies

(Alburez-Gutierrez et al., 2023). Structures that were once horizontally-dominated by siblings, cousins, and aunts and uncles have become vertically-dominated ‘beanpole’ networks of parents, children, and grandparents (Bengtson, 2001; Murphy, 2011; Verdery, 2015).

These major demographic shifts have not taken place uniformly across social groups. While there have always been social gradients in childbearing—including ages at childbearing, family size, and multi-partner fertility—many of these gradients have reversed over the course of the twentieth century (Esping-Andersen & Billari, 2015; Kravdal & Rindfuss, 2008). These changes have led to enormous variation in family size and generational length across families. Within European countries, the age at entry into grandparenthood has an interquartile range of around 10 to 15 years (Leopold & Skopek, 2015), and inter-household variation in generational length has increased over time (Margolis & Verdery, 2019). As a result, the majority of Europeans are now part of three-generation families, less than a fifth belong to two- or four-generation families, and only 8% have no vertical kin (Puur et al., 2011).

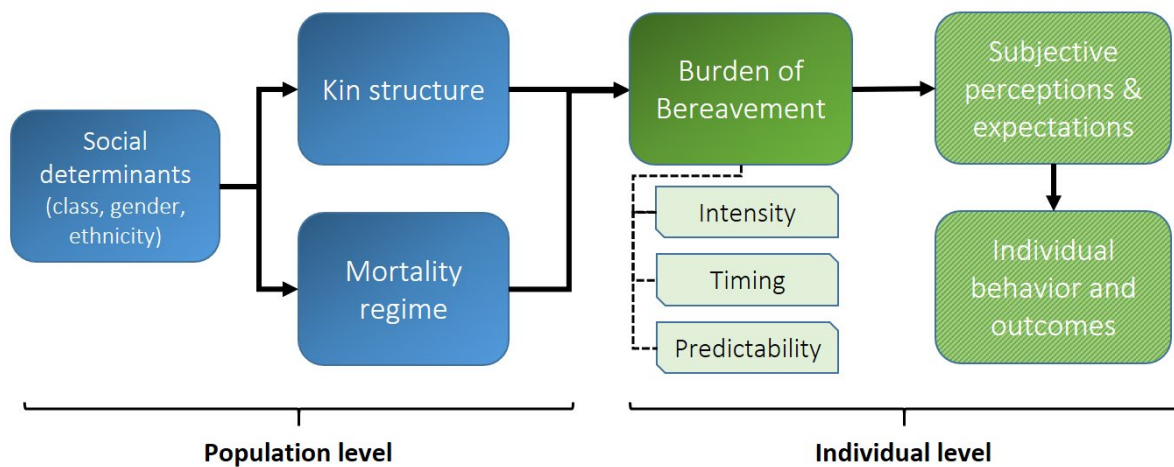
The size of kin networks also varies considerably across race/ethnicity and socioeconomic status (Andersson & Kolk, 2023; Schafer & Vargas, 2016). Social gradients in family dynamics determine the exposure to family members of different ages, which, coupled with mortality inequalities, shape exposure to family bereavement. For example, educational attainment is associated with lower risk of mortality (Hayward et al., 2015), but also with later childbearing (Neels et al., 2017; Ní Bhrolcháin & Beaujouan, 2012). Thus, from the perspective of the child, he or she is at lower risk of losing a parent who is highly educated compared with a *parent of the same age* who is less educated; however, education tends to defer fertility to older ages, so if we were to compare *children of the same age*, the one whose parent has higher educational attainment is typically older and therefore subject to higher risk of mortality. This example demonstrates the potentially countervailing demographic forces at play, which together shape the real-life experience of family bereavement. With this in mind, our study aims to estimate the contribution of both mortality inequalities and variation in kinship structure to socioeconomic inequalities in family bereavement.

Conceptual framework

We introduce a conceptual framework of the burden of bereavement from a population perspective. A population perspective is one which emphasizes the role of demographic means, distributions, and rates, as well as their relationships, in understanding individual-level phenomena and their underlying mechanisms (Duncan, 2008). Our framework aims to clarify

how the burden of family bereavement is shaped by demographic factors, how that burden varies across individuals and social groups, and, ultimately, how differential exposure to bereavement may give rise to different modes of thinking, feeling, and acting. This framework is rooted in three distinct bodies of literature: social inequalities in mortality, kinship demography, and life course theory.

Figure 1. Conceptual framework linking demographic factors to individual-level experience of family bereavement, risk perceptions, and social outcomes.



The relationship between macro-level demographic factors and the individual-level experience of family bereavement is shown in Figure 1. On the left-hand side, social determinants (class, gender, race/ethnicity) shape social gradients in both mortality and in kinship (size, age, type of relations). These factors, in turn, combine to shape the *burden of bereavement*, a concept we define below, across the life course from the perspective of Ego (the bereaved). In this study we explore the role of socioeconomic status in shaping the burden of bereavement via both pathways: kinship and mortality. From this perspective, differences in the burden of bereavement across socioeconomic strata may be attributed to (1) differences in the size and age structure of their respective family networks, assuming no difference in age-cohort-specific mortality rates of each kin member; and (2) kin members being subjected to different mortality regimes, assuming similarly sized and age-structured family networks.

Incorporating key tenets of life course theory (Carr, 2018; Elder, 1998) into our framework, we conceptualize the burden of bereavement as a multifaceted phenomenon relating to (1) *intensity*, referring to the cumulative number of kin deaths Ego is exposed to, by age; (2)

the *timing* of kin loss during Ego's life course (e.g., losing a parent during childhood); and (3) the *predictability* of kin loss with respect to the expected generational ordering (e.g., losing a child vs. losing a parent). Based on prior research, briefly reviewed above, each of these aspects of bereavement directly impacts the bereaved with respect to coping mechanisms, psychological wellbeing, and social outcomes (Carr, 2004; George, 1993; Hagestad, 1996). For example, while most individuals in low-mortality countries outlive their parents, the timing during the life course in which parental loss occurs (e.g. during childhood versus midlife) can carry life-long implications ranging from emotional to economic support, among others.

Importantly, our framework views the burden of bereavement not only as an outcome of social and demographic determinants, but also as their cause. On the right-hand side of Figure 1, we draw attention to the role of differential exposure to bereavement in shaping individual perceptions, expectations, and subsequent behavior. For example, the loss of family members has been linked to changes in subjective survival expectations (Dormont et al., 2018; Griffin et al., 2013; Hurd & McGarry, 2002), which are ultimately tied to social and economic behaviors and outcomes such as early retirement and social security claims (Hurd et al., 2004; van Solinge & Henkens, 2010). Although the present study does not test this pathway empirically, our framework highlights the potential explanatory role of the burden of bereavement in accounting for other individual and group level outcomes. In other words, it draws a direct link between the demographic factors shaping family bereavement, the lived experience of family bereavement, and the social consequences of that experience.

We expect to find a socioeconomic gradient in family bereavement and that this gradient will be shaped by both mortality inequalities and variation in kinship structure. Specifically, based on the conceptual framework and theoretical background, we hypothesize that mortality inequalities contribute to higher burden of family bereavement among individuals with lower levels of education and income. This higher burden may be manifested in all facets of bereavement: greater number of deaths of family members experienced on average, by age, up to middle adulthood (intensity); higher probability of losing kin in the parental generation during childhood (timing); and higher probability of losing kin in contemporary generation (sibling, cousin) or descendant generation (children, nieces and nephews) by middle adulthood (predictability). Furthermore, we hypothesize that socioeconomic variation in kin structure is an important determinant of inequalities in family bereavement, though we do not have a strong assumption about the direction of such effect (i.e., whether it will exacerbate or offset disparities in bereavement due to mortality inequalities).

We apply our conceptual framework and test these hypotheses using one birth cohort in Sweden, around which we construct four-generation kinship networks. The next section provides a brief overview of recent trends in mortality inequalities and kinship demography in Swedish society.

Sweden as a case study

Swedish society exhibits one of the lowest levels of income inequality among OECD countries (OECD, 2015). Its welfare regime is characterized by relatively extensive universal welfare provision and strong redistributive policies (Bambra, 2007). Nevertheless, Sweden too has seen persistent and even growing social inequalities in mortality in recent decades. Mortality inequalities are observed across multiple social factors, including socioeconomic status (Katikireddi et al., 2020), gender (Sundberg et al., 2018), migration background (Wallace, 2022), and geographic regions (Wilson et al., 2020). Class-based mortality inequalities in particular have been on the rise in Sweden since the 1950s (Bengtsson et al., 2020). These social determinants of health and mortality likely also shape population-level patterns of family bereavement.

With respect to kinship, Sweden is characterized by low fertility (though comparatively high by European standards over the past few decades) and diverse family structures. Considered a forerunner of the Second Demographic Transition (Ohlsson-Wijk et al., 2020), Sweden's cohort fertility rate was just below replacement level (1.9 births per woman) until recent years and cohabitation has long replaced marriage as the modal union form (though marriage is regaining popularity in recent years) (Ohlsson-Wijk, 2011). Divorce and separation rates increased almost steadily through the early 1970s, before leveling off, and a commensurate uptake in re-partnering meant an increase in family complexity (Ohlsson-Wijk et al., 2020). Trends in union instability, coupled with increasing multi-partner fertility, have meant a rising share of half-siblings in kin networks (Kolk et al., 2023).

Increasing socioeconomic inequality in Sweden has also contributed to the changing social gradients in family formation and childbearing (Van Winkle, 2020). High socioeconomic status in Sweden is now associated with higher fertility whereas childlessness is most common among the least educated women, a complete reversal from what was observed among cohorts born before the 1960s (Jalovaara et al., 2019). These complex trends in marriage, fertility, and mortality have led to considerable variation in kinship size in Sweden, even among the same birth cohorts (Kolk et al., 2023). Thus, rather than adopt a model-based analytical approach, we

trace the genealogies of the Swedish 1973 birth cohort using administrative data to estimate the actual burden of bereavement, by education and income, across the life course.

This particular cohort was born amid the expansion of the Swedish welfare state, in which income inequalities were relatively low (Lundberg & Åmark, 2001). However, throughout their lives Sweden experienced rising socioeconomic inequalities and growing inequalities in mortality (Bengtsson et al., 2020; Gurzo et al., 2024). Focusing on this cohort uniquely allows us to capture kin loss across four generations. We are able to follow members of this cohort from birth through early midlife—long enough to observe the death of parents, contemporaries, and descendants—and it is also one of the first Swedish cohorts in which the majority of grandparents can be identified in the population register.

Data and Methods

Genealogies

We used administrative registers of Sweden's entire population including monthly information on births and deaths, and identified biological and in-law relations via unique personal identification numbers, and through marital and residential records. Our index cohort is the 1973 birth cohort, born in Sweden to Swedish-born parents ($N = 82,709$). In order to study complete genealogies we conditioned the population on having identifiable grandmothers on both the maternal and paternal side and finally excluded about 3.5 % of this population who either died before 2020 or emigrated without returning before 2020 ($N=80,308$).

We constructed kinship networks of the index cohort, including all kin ever alive and ever resided in Sweden from an index individual's birth to age 47 (i.e. from their birth in calendar year 1973 through the end of 2020). Grandparents, parents, aunts and uncles, cousins, full- and half siblings, nieces and nephews were identified using parent-child linkages. Spouses, parents-in-law, and brothers and sisters in-laws (of both spouse and siblings) were identified via partnership linkage. Partnership links consisted of either marriage or co-residence with a childbearing partner. In-law kin were no longer enumerated following union dissolutions.

Socioeconomic status

Socioeconomic status (SES) was measured using educational attainment and income. Educational attainment was operationalized as the highest level of education achieved by age 47, categorized into four groups: ISCED levels 0–2 (basic education, lower-secondary or short/interrupted upper-secondary education – 13%), 3 (upper-secondary education– 37%), 4–

5 (post-secondary or short-cycle tertiary education – 33%), and 6–8 (bachelor’s degree or equivalent, and above– 15%) (UNESCO, 2012). We also measured SES using annual income earnings based on taxation registers. Earnings were measured at ages 39, 40, and 41, taking the highest value achieved during those three years and grouping the cohort into sex-specific income rank quartiles. Linkage to kin did not vary substantially by Ego’s socioeconomic status. For example, a full set of grandmothers were identified for 88.0% of cohort members in ISCED levels 0–2, 90.1% in ISCED level 3, 90.9% in ISCED levels 4–5, and 90.7% in ISCED levels 6–8. Kin population by education and income is shown in Appendix Tables A1 and A2.

Kin bereavement and analytical approach

We enumerate the death of every individual kin-member beginning from ego’s birth in 1973. Thus, bereavements of kin prior to the birth of ego are not enumerated unless otherwise stated. If kin members out-migrate without returning before 2020, they are censored at the year after last observed residence (folkbokföring) in Sweden.

We counted bereavements in total and for each kin group, at each chronological age of ego from 0 to 47, separately for each education group and income quartile. We computed the number of bereavements, in total and within each kin group (e.g. grandparent, cousin, etc.), at each chronological age of ego from 0 to 47. We then calculated, for each SES group, the average number of bereavements per kin group, from ages 0 to 47. Second, we estimated the average cumulated number of bereavements, in total and within each kin group, from age 0 to 47, separately for each SES group. Third, we estimated the education (absolute level) and income (relative rank) gradients in bereavement. The burden of bereavement was measured with respect to its intensity, timing, and predictability. For intensity, we enumerated the cumulative number of kin deaths by age, from birth to age 47. For timing, we estimated the odds of experiencing at least one kin loss in the grandparents’ and parents’ (parents, aunts, uncles and parents-in-law) generations by ages 18 and 47. For predictability, we estimated the same odds, by age, of losing at least one kin member in the contemporaneous (full/half/in law-sibling, cousin) and descendant (own children, nieces and nephews) generations. We predict each of these binary dependent variables by educational attainment levels (or income quartiles) in a logistic regression, holding the highest SES group as reference category. We present the odds ratios with 95% confidence intervals.

Finally, using standard demographic decomposition methods (Das Gupta, 1993; Kitagawa, 1955), we decompose education and income-group differences in family

bereavement into two components: differences in kin structure and differences in kin mortality. For example, income-group differences in the yearly rate of kin bereavement (KBR), between the first and the fourth income quartiles, can be broken down (Eq. 1) by differences in kin age-specific death rates (*ASKDR*) and differences in the proportion of kin members in each age-group (*w*), using five-year kin-age-groups (*a*), for each age *i* of cohort members. A positive difference ($\Delta KBR > 0$) indicates a higher rate of kin bereavement for the low-SES, whereas a negative difference ($\Delta KBR < 0$) indicates a higher rate of bereavement in the high-SES group. Annual contributions can be further aggregated to cumulative exposure to family bereavement.

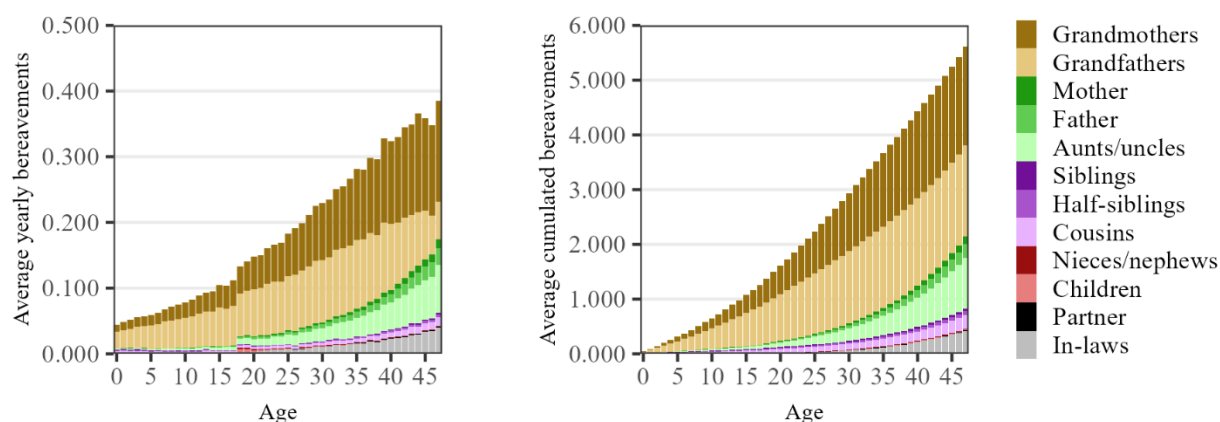
$$(Eq. 1) \quad \Delta KBR = \sum_{ai} \left[\left(\Delta w_{ai} \frac{ASKDR_H + ASKDR_L}{2} \right) + \left(\Delta ASKDR_{ai} \frac{w_{aH} + w_{aL}}{2} \right) \right]$$

Results

The burden of family bereavement across the life course

We first analyze the yearly incidence and cumulative exposure to kin bereavement for the cohort as a whole. The left-hand plot of Figure 2 shows the average number of kin deaths for each kin relation at a given age of the index population. An average member of the 1973 cohort experienced a total of 0.04 bereavements during his or her first year of life, and these are almost exclusively the death of grandparents. Toward age 20, loss of kin in the parental generation, including parents, aunts and uncles, and parents-in-law, becomes more substantial (the small uptake at age 18 is due to the addition of children, partners, and in-laws when crossing the legal age of marriage). By age 47, bereavement attributed to this group accounts for a roughly half of the yearly number of kin deaths (~0.4), with the other half dominated by grandparents. Through the ages, bereavement of generational contemporaries (cousins and full, half, and in-laws siblings) account for less than 0.01 yearly deaths, on average, and bereavement of descendant kin (including own children, nieces, and nephews) is even rarer.

Figure 2. Family bereavement across the life course, 1973 Swedish birth cohort (age 0 to 47). Left: Yearly average number of bereavements by kin relationship and age. Right: Cumulative number of bereavements by kin relationship and age.



The right-hand plot of Figure 2 shows the average cumulated number of kin deaths for each kin-relation of the index population. Note that these are bereavement events experienced by individuals born in 1973 who survived to 2020. In total, cohort members have experienced nearly six kin deaths by age 47. Of these, the four grandparents account for two-thirds. Second in order of magnitude are aunts and uncles, who outnumber each of the other kin relations in the parental and grandparental generations—by age 47, a member of our index cohort has seen, on average, slightly more than one of his or her aunts or uncles pass away.

Socioeconomic differences in family bereavement: Intensity, timing, and predictability

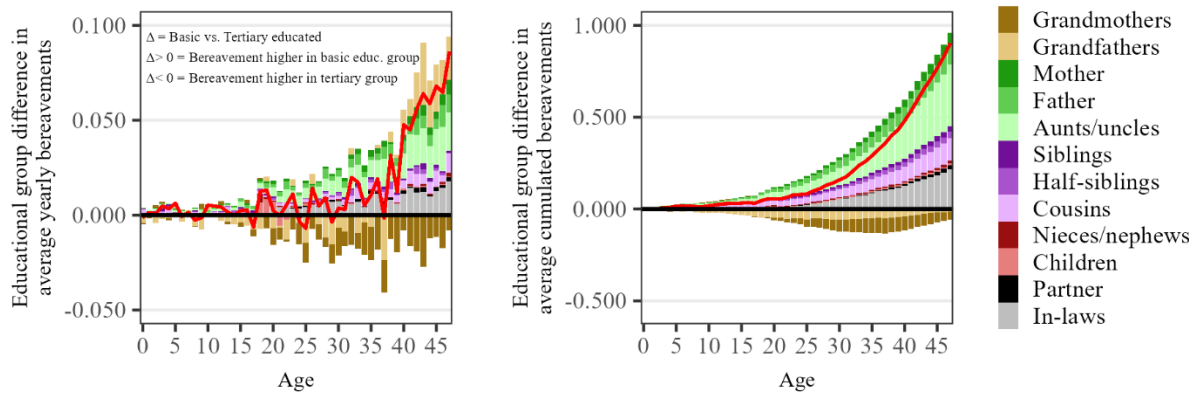
Next, we break down the burden of bereavement (intensity, timing, and predictability) by socioeconomic status. Kinship networks have been shown to differ by SES. In particular, the growth of kinship networks through the birth of ‘downstream’ kin (children, nieces, nephews) and the addition of in-laws of parental and contemporaneous generation (in-law siblings) tends to occur earlier in the life course among low-SES men and women. These SES differences in kinship network size are largely attributed to tempo effects (i.e., earlier childbearing among low-SES men and women), and declines with age. Due to higher union instability, however, individuals of low SES have fewer remaining in-laws at later age, compared with individuals of high SES (Andersson & Kolk, 2023).

We show results below by educational attainment level and in the Appendix for income quartiles. The left-hand plot of Figure 3 shows the difference between the average yearly number of kin deaths, by Ego’s age and kin relation, between the lowest (basic or lower

secondary) and highest (tertiary) education groups. Negative values indicate more bereavement in the low education group whereas positive values indicate more bereavement in the high education group. The net difference is indicated by the red line, which almost invariably favors the high education group. In other words, at almost every age the average yearly number of bereavements is higher among the low education group. Furthermore, the additional bereavements in the low education group are primarily driven by deaths in the parental generation, and to a lesser extent among the contemporaneous generation. By contrast, the high education group experiences more deaths of grandparents from about age 15 and onward.

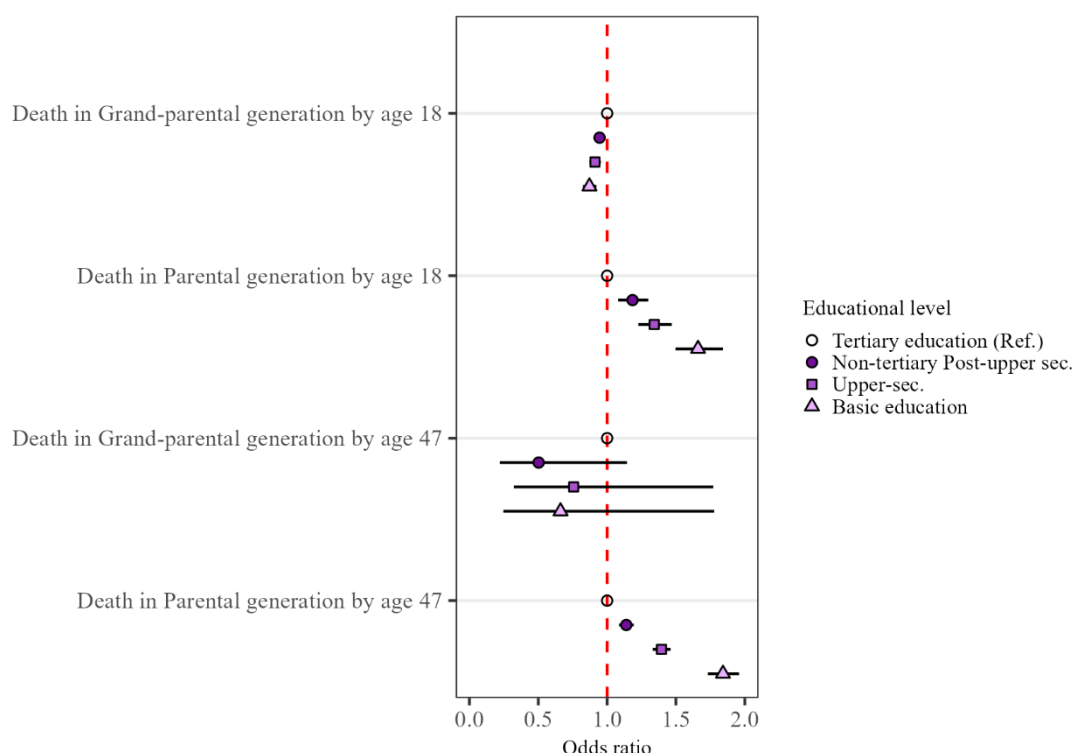
The right-hand plot of Figure 3 shows the difference in intensity of bereavement across the life course, referring to the cumulative average number of kin deaths, between the low and high education groups. Note that this measure of bereavement is conditional on members of the 1973 cohort surviving to age 47, in order to reflect the cumulative experience of kin loss by 2020 among comparable individuals with respect to their stage in the life course, but with different levels of SES. By age 47, the low education group has experienced nearly one additional death in the extended family. Since relatively few individuals have surviving grandparents at age 47, irrespective of their level of education, this difference is driven by deaths in the parental (particularly aunts, uncles, and in-laws) as well as deaths in the contemporaneous generation (sibling, half-siblings, and cousins). At earlier stages of life, however, the gradient, albeit very small, is driven by deaths of grandparental and contemporaneous kin. Overall, these findings lend support to our hypothesis that the intensity of family bereavement will differ across socioeconomic strata in the same direction that mortality differs by socioeconomic status in the general population.

Figure 3. Intensity of family bereavement by educational attainment, 1973 Swedish birth cohort. Left: The difference between basic and tertiary education groups in average yearly number of kin deaths. Right: The difference between basic and tertiary education groups in average cumulative number of kin deaths. The red line indicates the net difference between education groups across all relationship types.



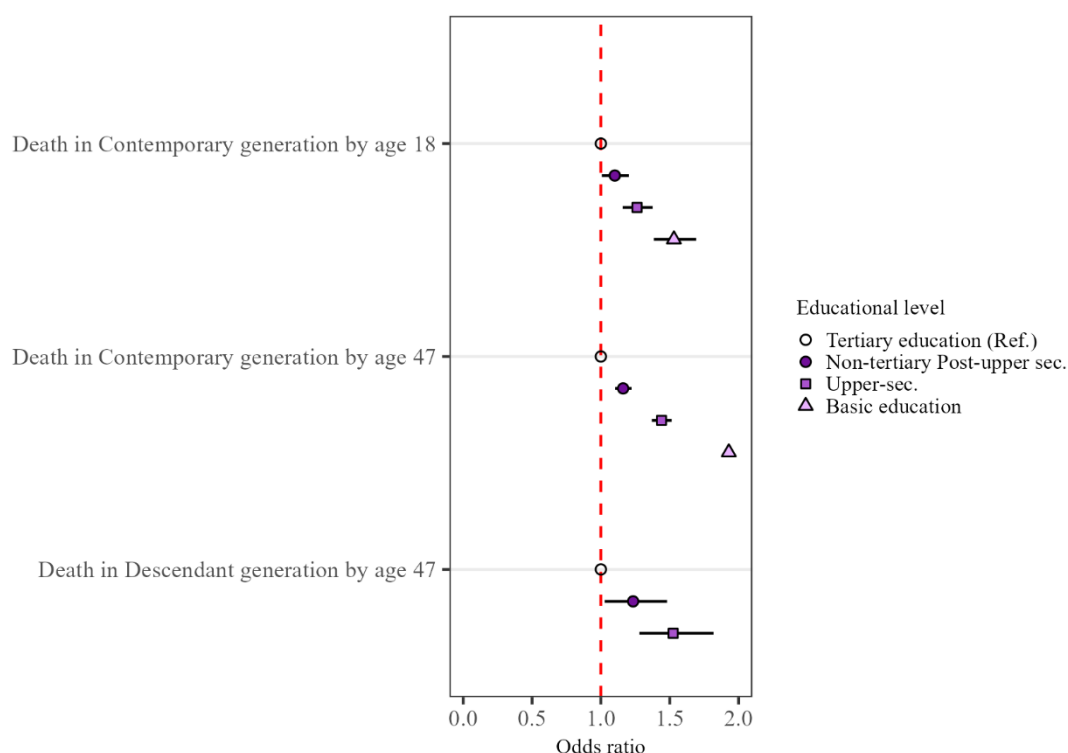
Whereas Figure 3 focused on socioeconomic differences in the intensity of bereavement across the life course, Figures 4 and 5, respectively, focus on differences in the timing and predictability of bereavement. Here, we estimated the educational gradient in the odds of losing at least one kin of each generation, relative to Ego, by select ages (18 and 47). In Figure 4, we test differences in experiencing bereavement in the parental and grandparental generations by Ego's age. Although these deaths have come to be expected in low-mortality countries, from the perspective of Ego, their consequences are nevertheless dependent on the timing in which they occur during Ego's life course. The outcomes are expressed as the odds ratio of experiencing the given bereavement across the three lower education categories (basic, upper secondary, and post-secondary) relative to the tertiary education group. We find no substantive difference across education groups in ever experiencing the death of at least one grandparent by age 18. By contrast, there is a clear and statistically significant education gradient in the odds of bereavement in the parental generation by age 18—the lower the level of Ego's education, the higher the odds of bereavement. This general pattern is repeated when estimating at least one bereavement by age 47—no significant differences in the grandparental generation and a negative education gradient in bereavement in the parental generation. These findings too support our hypothesis that the probability of bereavement in the parental generation *during Ego's childhood* will be negatively associated with socioeconomic status.

Figure 4. Odds ratio of ever experiencing kin death in grandparental or parental generation by age 18 and age 47, by level of education. Reference group: tertiary education. Logistic regression, 1973 birth cohort.



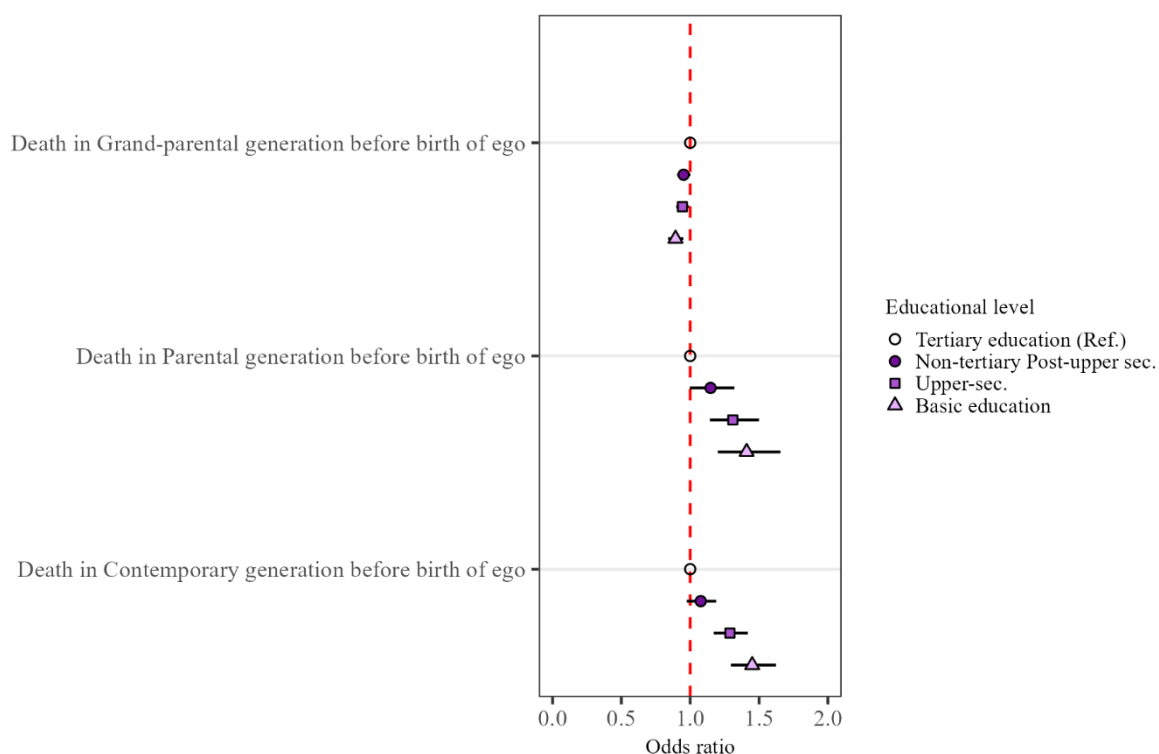
In much the same way, Figure 5 shows the odds ratios of losing at least one kin member in the contemporaneous and descendant generations, by Ego's age. Unlike deaths in the grandparental and parental generations, these deaths are generally not expected in low-mortality countries during (Ego's) childhood and early midlife. Here too, we find a systematic education gradient in the odds of losing at least one sibling, half-sibling, or cousin by ages 18 and 47, as well as in the odds of losing a child, niece, or nephew by age 47 (the vast majority of cohort member, irrespective of education, had no children by age 18, and almost no deaths occurred among the descendant generation by that age). Thus, as predicted, the lower the level of Ego's education the greater the odds of bereavement.

Figure 5. Odds ratio of ever experiencing kin death in contemporaneous and descendant generation by age 18 and age 47, by level of education. Reference group: tertiary education. Logistic regression, 1973 birth cohort.



Lastly, for completeness we also estimated the odds of losing at least one kin in the grandparental, parental, and contemporaneous generation prior to Ego's birth (Figure 6). Accounting for these deaths may be important for two reasons. First, the death of kin (e.g. grandparent) prior to birth reduces the risk of experiencing bereavement after birth. Second, the death of kin may have an impact on Ego even if it is not experienced directly (e.g., loss of a parent prior to birth). Similar to the previous results, we find no substantial education differences in the odds of losing at least one grandparent prior to birth, but a negative education gradient in the odds of losing at least one kin in the parental and contemporaneous generation. The lowest education group was most likely, and the highest education group least likely, to have had aunts and uncles (and, in rare cases, fathers) die before ego was born.

Figure 6. Odds ratio of kin death prior to Ego's birth by level of education. Reference group: tertiary education. Logistic regression, 1973 birth cohort.



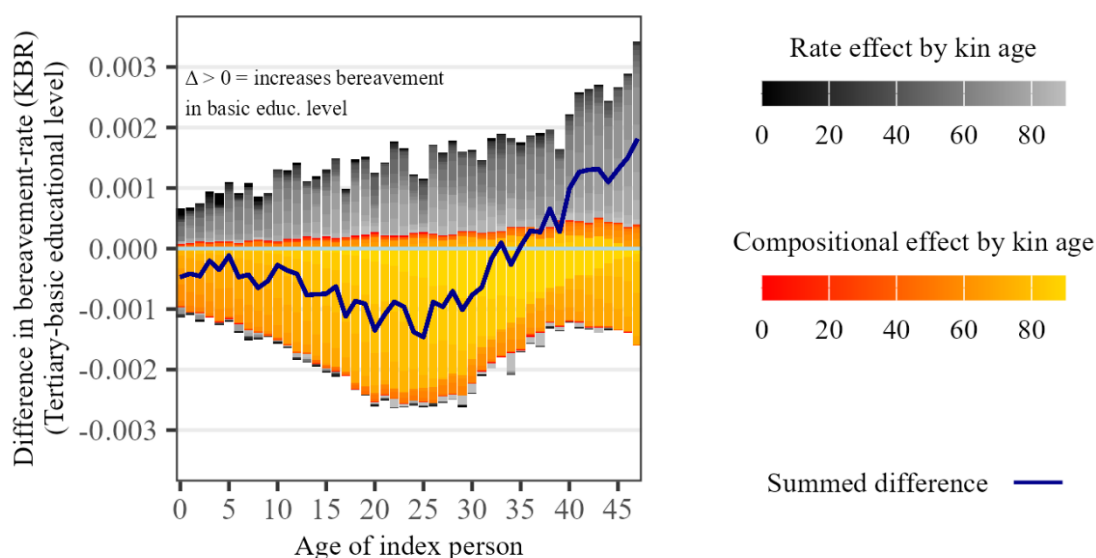
The role of kin age structure versus kin mortality

The results thus far indicate a socioeconomic gradient in all facets of the burden of family bereavement: intensity, timing, and predictability. However, the direction and size of the gradient may be shaped by multiple demographic processes. Mortality is higher in the kin networks of low-SES individuals, which contributes to the gradient in family bereavement. What remains unclear is the extent to which inequalities in family bereavement are exacerbated or offset by differences in the age-structure of family members, which result from differential fertility and generational length across socioeconomic strata. In order to better-understand the demographic determinants of this gradient, we decompose the incidence rate of kin bereavement to differences in kin mortality and differences in kin structure.

Specifically, we focus on the yearly incidence rate of family bereavement, disaggregating it by kin-members across five-year age groups. We then decompose the difference between the lowest and highest education groups into a component owing to education differences in the stock of kin of a given five-year age group, and a component owing to education differences in the death rate of these kin age-groups. The results are shown in

Figure 7. Bars with negative values indicate a contribution to more bereavement in the highest education group, whereas bars with positive values indicate a contribution to more bereavement in the lowest education group; the shades of gray indicate the impact of differences in kin death rates, and the shades of yellow-to-red indicate the impact of differences in the stock of kin in each age groups.

Figure 7. Decomposition of difference in yearly bereavement rate between basic and tertiary education groups, by kin age. 1973 Swedish birth cohort, ages 0 to 47.



Overall, the yearly kin bereavement rate is higher among the high-education group until about age 35, after which it is higher among the low-education group through age 47. The age composition effect favors the low-education group because their kin tend to be younger. In particular, the grandparents, parents, aunts, uncles, and parents-in-law of higher educated individuals are on average older compared to those of their less educated counterparts. By contrast, the kin mortality effect, or the rate effect, favors the high-education group at every age because kin mortality is higher in the low-education group. Thus, for this particular birth cohort, socioeconomic differences in kinship partly offset inequalities in family bereavement due to mortality inequalities. In other words, inequalities in family bereavement would have been even greater had different education groups shared a similar kin age structure.

To reconcile these results showing lower kin bereavement rates among the lower educated (up to around age 35) with their higher overall kin bereavement counts (Figure 3), differences in overall kinship network sizes need to be considered. Prior research using the

same data found that men and women from low SES backgrounds in the 1973 and adjacent birth cohorts had larger kinship networks due to the higher fertility rates of earlier generations (Andersson & Kolk, 2023). Low-SES individuals on average have more aunts, uncles, and cousins relative to high-SES individuals of the same age. Thus, despite having lower incidence rates of kin bereavement until age 35, they effectively experience more kin deaths across the life course due to their larger kin networks, as well as higher kin bereavement rate after age 35.

We further analyzed the socioeconomic gradient in family bereavement using income quartiles instead of educational attainment as the stratifying variable (see Appendix Figures A1 to A5), and find similar patterns to those presented here.

Discussion

The importance of family bereavement as a driver of social change has long been recognized in demography, including its potential impact on individuals' modes of feeling, thinking, and acting (Montgomery, 2000). Bereavement has direct implications for the physical, social, and psychological wellbeing of the bereaved (Fletcher et al., 2013; Rogers et al., 2008; Sasson & Umberson, 2014). Depending on the relationship to the bereaved, the loss of family members can also lead to change in living arrangements, loss of financial security, and diminished social connectedness and support (Bonnet et al., 2010; Streeter, 2020; Utz et al., 2014). Given the ubiquity of family bereavement as a human experience and how deeply it affects individuals, families, and communities, a comprehensive framework is needed for understanding how demographic processes shape the experience of bereavement across the life.

Whereas social disparities in mortality are well documented, the demographic research literature has only just begun to understand whether and how these disparities result in inequalities in the experience of bereavement. Moreover, socioeconomic inequalities in bereavement are particularly difficult to predict because of the potentially countervailing effects of mortality differentials and differences in kin structure across social groups. Finally, there is a need for theoretically informed measures that capture different aspects of the experience of bereavement.

In this study we proposed a demographic framework of family bereavement which considers the role of both socioeconomic variation in kinship patterns and socioeconomic disparities in kin mortality in shaping the individual experience of bereavement. Our framework further conceptualizes the burden of bereavement in relation to its intensity (how many deaths in the family have been experienced by a given age), the timing during the life course in which

these kin deaths were experienced, and how predictable they were with respect to generational ordering (e.g., parent outliving a child versus child outliving a parent). Lastly, our framework highlights the pathways through which inequalities in bereavement may be important drivers of social and economic behavior and outcomes.

Applying this framework to the 1973 Swedish birth cohort and their four-generation kin networks, we find that the burden of bereavement experienced by age 47 is higher among the low education group by about one kin-member in comparison with the high education group. Moreover, this excess burden of bereavement is driven primarily by the death of parents and kin of the same generation (siblings, cousins), and it tends to occur earlier in Ego's life. By contrast, high SES individuals were less likely to experience the death of parents, siblings, and children by the same age. The timing and predictability of bereavement similarly vary by education and income levels. For instance, the odds of experiencing death in the parental generation by age 18, or the death of kin in the same generation as Ego by age 47, are 1.5 to 2 times higher in the lowest education level compared to the highest education level. Overall, we find support for our hypotheses that lower SES groups experience greater burden of bereavement, and that this burden is expressed in terms of the number of deaths experienced, when they are experienced during the life course, and how predictable those deaths are with respect to their generational ordering.

It may be tempting to equate inequalities in bereavement with inequalities in mortality. However, the burden of bereavement is also shaped by group differences in kinship patterns. Our decomposition analysis revealed that whereas lower socioeconomic groups in Sweden were disadvantaged with respect to mortality rates, their kin were younger on average, which tended to offset the inequality in family bereavement. However, it is important to contextualize our findings. Sweden is characterized by low levels of mortality and fertility, relatively small (albeit increasing) socioeconomic gradient in mortality, and moderate levels of intergenerational mobility (Bengtsson et al., 2020; Gurzo et al., 2024; Ohlsson-Wijk et al., 2020). In spite of these generally favorable conditions, by international standards, we observed a socioeconomic gradient in family bereavement. The same gradient may be steeper in other social contexts or historical periods, as well as across other social determinants, such as race and ethnicity.

Understanding inequalities in bereavement bears theoretical and practical implications. First, it is a first step toward understanding the full impact of mortality inequalities on society, which extends beyond the individuals who may be at greater risk of dying. This impact is dependent upon kin networks, because the death of each individual is experienced by multiple

family members. Second, inequalities in family bereavement may explain group differences in other social, psychological, and economic outcomes. Much of the research literature has focused on direct effects such as psychological distress and wellbeing. There may be other, more subtle effects, relating to how the experience of grief can alter one's time perspective by disrupting habitual expectations, future plans, and life narratives (how subjects make sense of their lives and the role they assign to their own agency in directing it) (Shardlow, 2022).

Changes in time perspective and future expectations can last long after the loss is experienced and shape subsequent social behavior and outcomes. For example, expectations regarding one's own survival are both shaped by the death of family members and impact social and economic decision-making, including when to retire from the labor force and when to claim social security benefits (Dormont et al., 2018; Hurd & McGarry, 2002; Liu et al., 2007). Furthermore, individuals whose time perspective focuses on the present tend to engage in risky behaviors whereas those with longer planning horizons tend to adopt healthier behaviors and lifestyles (Adams, 2009; Henson et al., 2006). These potential pathways linking exposure to family bereavement and population-level social, economic, and health outcomes make a promising direction for future research. Indeed, if mortality regimes operate as Durkheimian "social facts," that is, empirical regularities that are internalized by individuals and influence their behavior, then inequalities in bereavement, in addition to inequalities in mortality, may constitute a fundamental and overlooked form of disadvantage (Bernstein & Sasson, 2023).

To this end, and to spur the burgeoning research interest in a hitherto neglected field (Alburez-Gutierrez et al., 2022), this study has made several important contributions. First, it offered an empirical account, for the first time, of the burden of family bereavement across the life course using complete population data. Second, it documented a socioeconomic gradient in family bereavement, as well as how that gradient is shaped by differences in kin mortality and differences in kinship patterns. Third, adjudicating between intensity, timing, and predictability of bereavement, this study proposed a novel framework for conceptualizing the burden of bereavement and measuring it using administrative data.

Limitations

This study is not without limitations. First, relying on administrative data means that we can only identify nominal kin relations. Although our analysis goes beyond prior research to cover extensive familial relations, including cousins, in-laws, and half-siblings, among others, it may nevertheless miss other types of meaningful social ties that contribute to the burden of

bereavement (e.g., losing a close friend or a romantic partner prior to marriage or family formation). Furthermore, we have no indication as to how meaningful the kin relations we identify in administrative data really are in the lives of affected individuals. Prior research has shown that the quality of relationships matters for individuals' health and wellbeing, and may moderate psychological adjustment to the loss of family members (Carr, 2020; Lee et al., 2022; Thomas et al., 2017).

Second, we use Ego's adult SES as our primary explanatory variable. Conditioning on adult SES is susceptible to reverse causation (e.g., loss of kin early in life affects Ego's status attainment). Furthermore, both socioeconomic status and mortality are likely correlated, to varying degrees, among family members. Our intention is not to make strong claims about the underlying causes of family bereavement, but merely to characterize the burden of bereavement and how it varies across socioeconomic strata in actual (rather than modeled) populations. We encourage future research to disentangle these complex relationships by finding new ways to conceptualize and operationalize SES across family networks, as well as to study the role of family heterogeneity in shaping the burden of bereavement. Comparative work will be needed to, for example, to expound on variation in intergenerational transmission of socioeconomic status (and demographic behavior) and its relationship to kinship structures and experiences of bereavement.

Our empirical estimates can be useful for developing more sophisticated demographic microsimulations and mathematical models of kinship, both of which rely on strong assumptions about the independence of demographic processes (Goodman et al., 1974; Ruggles, 1993). High-quality estimates of socioeconomic variability in bereavement, such as the ones presented here, can be used to benchmark and ultimately improve model-based approaches of bereavement (Caswell et al., 2023).

Conclusion

This study highlights the importance of multiple demographic processes in shaping the experience of bereavement, as well as how it differs across social groups. It proposes a comprehensive framework for understanding how mortality regimes are experienced by individuals embedded in their extended-family networks, with respect to the intensity, timing, and predictability of bereavement across the life course. It is a first step toward linking group differences in mortality inequalities, from a population perspective, to how those differences

impact individuals and their families. In doing so, we hope to motivate new research at the intersection of social stratification, mortality, and the demography of kinship.

Conflict of interest declaration

The authors declare no competing interests.

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Appendix

Figure A1. Difference in intensity of family bereavement between lowest and highest income quartiles, 1973 Swedish birth cohort. Left: Difference in average yearly number of kin deaths. Right: Difference in average cumulative number of kin deaths. The red line indicates the net difference between income quartiles across all relationship types.

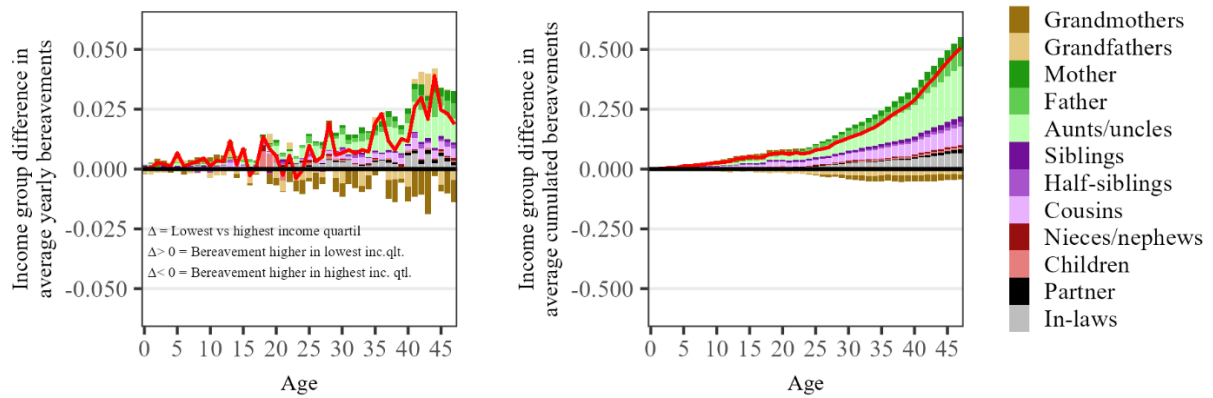


Figure A2. Odds ratio of ever experiencing kin death in grandparental or parental generation by age 18 and age 47, by income quartile. Reference group: highest income quartile. Logistic regression, 1973 birth cohort.

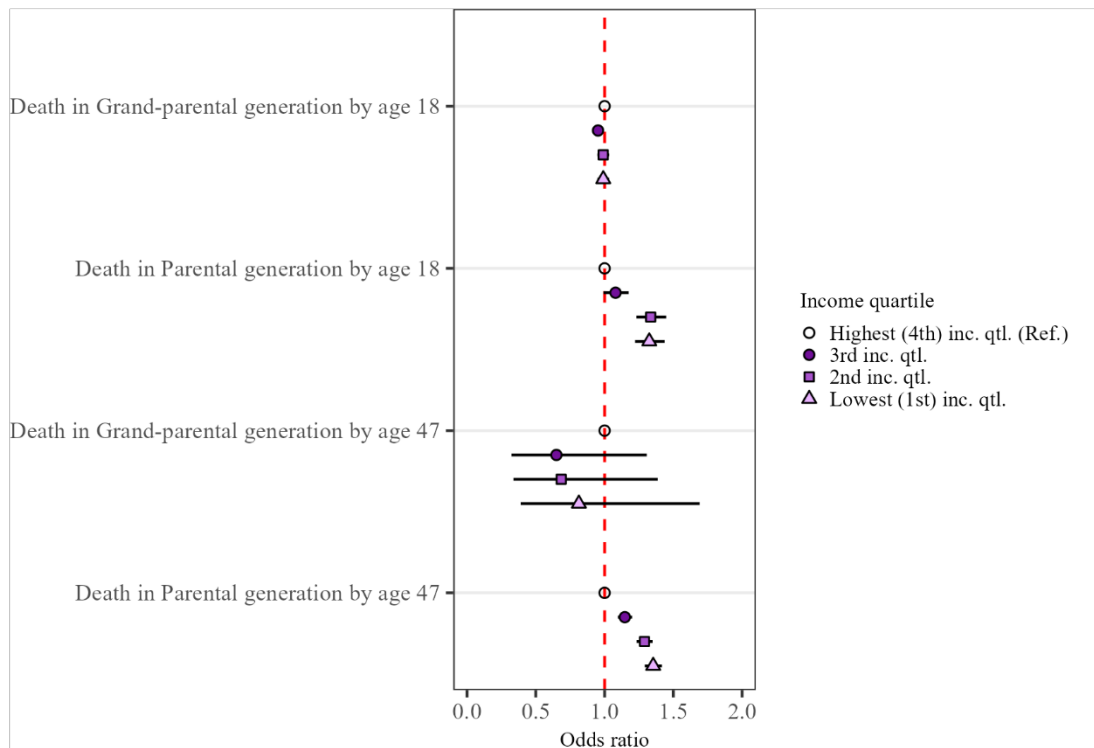


Figure A3. Odds ratio of ever experiencing kin death in contemporaneous and descendant generation by age 18 and age 47, by income quartile. Reference group: highest income quartile. Logistic regression, 1973 birth cohort.

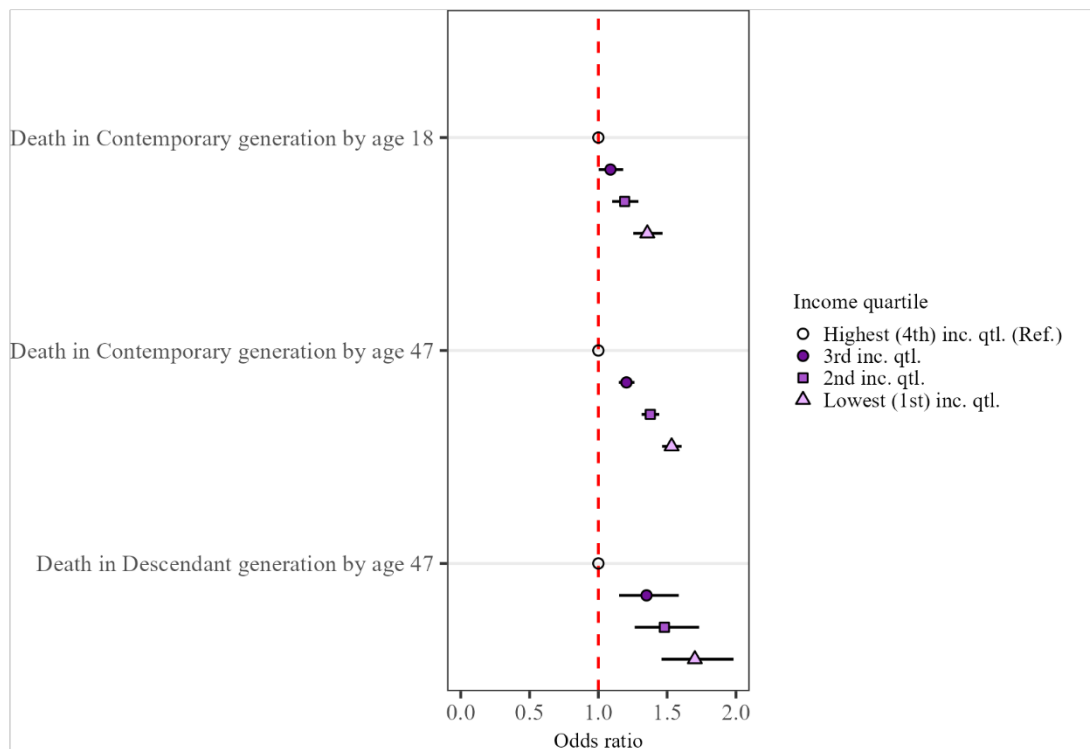


Figure A4. Odds ratio of kin death prior to Ego's birth by income quartile. Reference group: highest income quartile. Logistic regression, 1973 birth cohort.

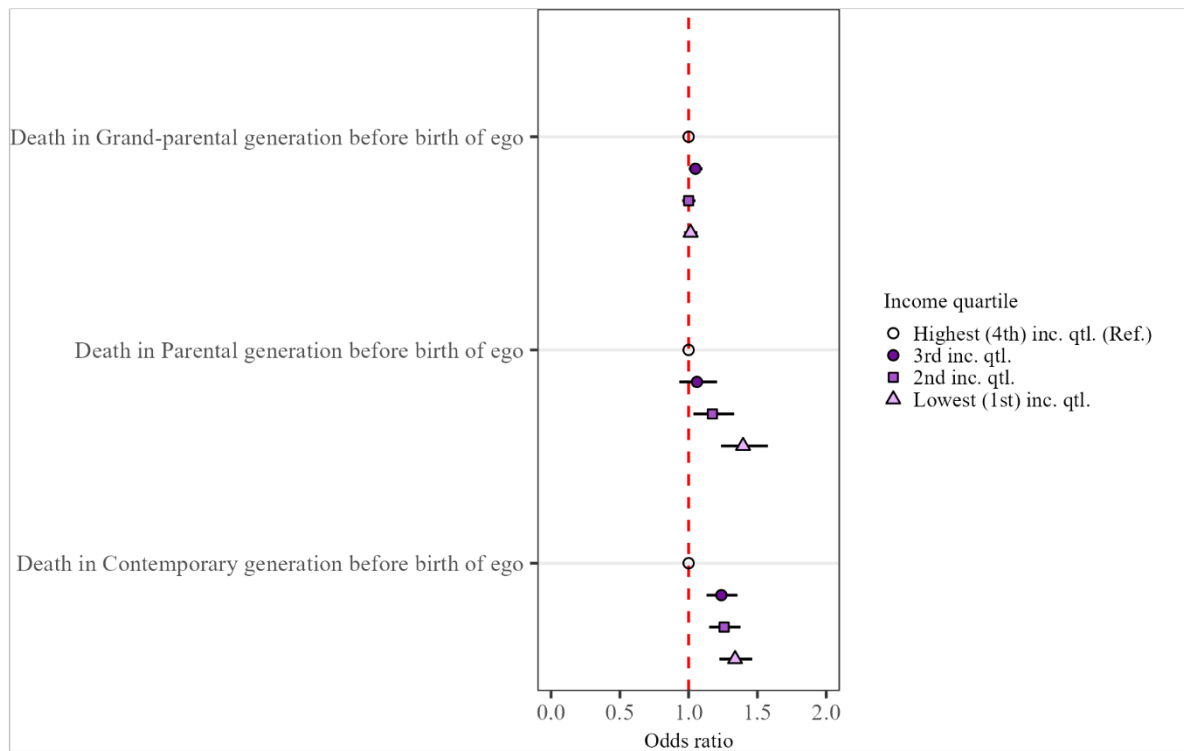


Figure A5. Decomposition of difference in yearly bereavement rate between lowest and highest income quartiles, by kin age. 1973 Swedish birth cohort, ages 0 to 47.

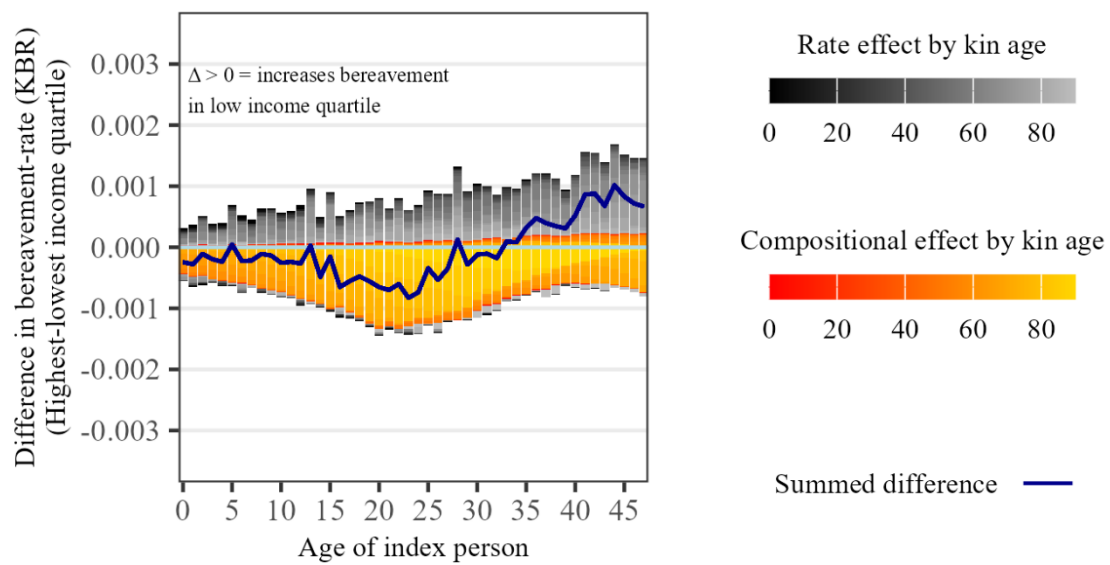


Table A1. Kin population by educational level, potential range of overcoverage and unreported deaths.

ISCED	N	YOB ¹	Not in death nor residence registers (NDR)				Not in death nor residence registers (NDR) (age above 90)		
			NDR (N)	NDR (%)	Age in 2020 ²	Last Yr. of obs ³	NDR (N)	NDR (%)	Age in 2020 ²
Grandmothers									
0-2	20461	1918	427	2,1	106	1982	413	2	107
3	57214	1918	1099	1,9	108	1984	1086	1,9	108
4-5	51949	1916	1123	2,2	108	1977	1109	2,1	108
6-8	24037	1915	440	1,8	109	1981	437	1,8	109
All	153661	1917	3089	2	108	1980	3045	2	108
Grandfathers									
0-2	18253	1915	797	4,4	111	1980	791	4,3	112
3	51408	1914	2174	4,2	112	1981	2147	4,2	113
4-5	46854	1913	2059	4,4	113	1979	2039	4,4	114
6-8	21766	1912	1098	5	114	1977	1093	5	114
All	138281	1914	6128	4,4	113	1980	6070	4,4	113
Mothers									
0-2	10673	1947	49	0,5	70	2003	0	0	0
3	29836	1947	102	0,3	71	2003	0	0	0
4-5	27043	1946	81	0,3	72	2002	0	0	0
6-8	12545	1945	52	0,4	72	2000	0	0	0
All	80097	1946	284	0,4	71	2002	0	0	0
Fathers									
0-2	10671	1945	97	0,9	73	1999	0	0	0
3	29833	1944	235	0,8	73	2001	0	0	0
4-5	27041	1944	225	0,8	74	2000	0	0	0
6-8	12544	1943	128	1	74	1999	0	0	0
All	80089	1944	685	0,9	74	2000	0	0	0
Aunts/uncles									
0-2	48135	1948	622	1,3	71	1993	0	0	0
3	125437	1947	1656	1,3	71	1991	0	0	0
4-5	106315	1946	1755	1,7	73	1989	0	0	0
6-8	46568	1946	1060	2,3	73	1989	0	0	0
All	326455	1947	5093	1,6	72	1990	0	0	0
Cousins									
0-2	101276	1975	2536	2,5	44	2003	0	0	0
3	257605	1975	6963	2,7	44	2003	0	0	0
4-5	215376	1975	7257	3,4	44	2003	0	0	0
6-8	94354	1975	3925	4,2	44	2003	0	0	0

All	668611	1975	20681	3,1	44	2003	0	0	0
Siblings									
0-2	14456	1972	297	2,1	46	2004	0	0	0
3	39269	1973	959	2,4	46	2004	0	0	0
4-5	35684	1973	1186	3,3	46	2005	0	0	0
6-8	16999	1973	774	4,6	45	2006	0	0	0
All	106408	1973	3216	3	46	2005	0	0	0
Half-siblings									
0-2	9743	1977	280	2,9	43	2005	0	0	0
3	17244	1977	508	2,9	42	2005	0	0	0
4-5	11261	1978	414	3,7	42	2005	0	0	0
6-8	3892	1978	178	4,6	40	2007	0	0	0
All	42140	1977	1380	3,3	42	2005	0	0	0
Nieces/nephews									
0-2	26376	2001	244	0,9	21	2012	0	0	0
3	70043	2003	645	0,9	20	2012	0	0	0
4-5	62355	2004	799	1,3	18	2012	0	0	0
6-8	30002	2006	455	1,5	15	2013	0	0	0
All	188776	2003	2143	1,1	18	2012	0	0	0
Children									
0-2	19082	2002	155	0,8	18	2011	0	0	0
3	52336	2004	420	0,8	16	2011	0	0	0
4-5	48602	2005	461	0,9	14	2012	0	0	0
6-8	23952	2006	360	1,5	13	2013	0	0	0
All	143972	2004	1396	1	15	2012	0	0	0
Spouses									
0-2	11058	1972	127	1,1	48	2009	0	0	0
3	29324	1973	300	1	47	2009	0	0	0
4-5	25825	1972	364	1,4	48	2010	0	0	0
6-8	12003	1972	231	1,9	47	2010	0	0	0
All	78210	1972	1022	1,3	47	2010	0	0	0
In-laws									
0-2	54023	1961	962	1,8	56	2002	11	0	98
3	141177	1962	2300	1,6	55	2002	24	0	96
4-5	119322	1961	2352	2	54	2003	15	0	98
6-8	54245	1961	1313	2,4	53	2004	9	0	96
All	368767	1961	6927	1,9	54	2003	59	0	97

Notes: ¹Mean year of birth, ²Mean age in 2020 if assumed alive, ³Mean year of last observation in RTB without a corresponding death-date. Individuals (Kin-members) who never have been registered in Sweden are not identifiable and thus not included in the study population and are not enumerated as kin or contribute to the bereavement numerator. Individuals (kin-members) who are ever observed and at some point no longer observed from the residential registers ('register över totalbefolkningen', RTB) without returning by 2020 without a death date are

treated as migrated. Dates of death of overseas populations are often reported to Statistics Sweden and updated in the death registers with some lag, but such reports and/or registry updates does not always take place. Migrated individuals (and individuals treated as such) without a death-date who are older than 90 in 2020 are treated as deceased at age 90. ISCED levels 0–2 (basic education, lower-secondary or short/interrupted upper-secondary education), 3 (upper-secondary education), 4–5 (post-secondary or short-cycle tertiary education), and 6–8 (bachelor’s degree or equivalent, and above)

Table A2. Kin population by income quartile, potential range of overcoverage and unreported deaths.

			Not in death nor residence registers (NDR)				Not in death nor residence registers (NDR) (age above 90)		
Income quartile	N	YOB ¹	NDR (N)	NDR (%)	Age in 2020 ²	Last Yr. of obs ³	NDR (N)	NDR (%)	Age in 2020 ²
Grandmothers									
1st	37128	1917	783	2,1	108	1982	769	2,1	108
2nd	37156	1917	742	2	108	1979	731	2	108
3rd	37062	1917	722	1,9	108	1979	714	1,9	108
4th	37245	1916	752	2	108	1980	742	2	108
All	148591	1917	2999	2	108	1980	2956	2	108
Grandfathers									
1st	33178	1914	1501	4,5	112	1983	1480	4,5	113
2nd	33450	1914	1401	4,2	113	1980	1392	4,2	113
3rd	33481	1914	1445	4,3	113	1978	1431	4,3	113
4th	33653	1913	1550	4,6	113	1977	1539	4,6	113
All	133762	1914	5897	4,4	113	1979	5842	4,4	113
Mothers									
1st	19375	1947	66	0,3	70	2002	0	0	0
2nd	19373	1947	39	0,2	70	2002	0	0	0
3rd	19353	1947	45	0,2	71	2004	0	0	0
4th	19357	1946	63	0,3	72	2002	0	0	0
All	77458	1946	213	0,3	71	2003	0	0	0
Fathers									
1st	19371	1944	179	0,9	73	2000	0	0	0
2nd	19371	1944	97	0,5	74	1998	0	0	0
3rd	19352	1944	129	0,7	73	2000	0	0	0
4th	19356	1944	191	1	74	2000	0	0	0
All	77450	1944	596	0,8	73	2000	0	0	0
Aunts/uncles									
1st	83353	1947	1229	1,5	72	1991	0	0	0
2nd	82155	1947	1048	1,3	71	1990	0	0	0
3rd	78283	1947	1097	1,4	72	1990	0	0	0
4th	72738	1946	1493	2,1	73	1989	0	0	0
All	316529	1947	4867	1,5	72	1990	0	0	0
Cousins									
1st	171764	1975	4953	2,9	44	2004	0	0	0
2nd	169271	1975	4462	2,6	45	2003	0	0	0
3rd	160364	1975	4858	3	44	2003	0	0	0
4th	147332	1975	5560	3,8	45	2003	0	0	0

All	648731	1975	19833	3,1	44	2003	0	0	0
Siblings									
1st	25791	1973	639	2,5	46	2005	0	0	0
2nd	26076	1973	586	2,2	46	2005	0	0	0
3rd	25760	1973	668	2,6	45	2005	0	0	0
4th	25311	1973	1007	4	46	2005	0	0	0
All	102938	1973	2900	2,8	46	2005	0	0	0
Half-siblings									
1st	13565	1977	398	2,9	43	2005	0	0	0
2nd	10579	1977	271	2,6	42	2005	0	0	0
3rd	8929	1977	300	3,4	42	2005	0	0	0
4th	7724	1978	335	4,3	41	2005	0	0	0
All	40797	1977	1304	3,2	42	2005	0	0	0
Nieces/nephews									
1st	44941	2003	449	1	20	2012	0	0	0
2nd	46866	2003	450	1	20	2012	0	0	0
3rd	45847	2004	459	1	18	2012	0	0	0
4th	45502	2005	637	1,4	17	2012	0	0	0
All	183156	2003	1995	1,1	18	2012	0	0	0
Children									
1st	32259	2004	157	0,5	16	2015	0	0	0
2nd	35833	2004	78	0,2	21	2016	0	0	0
3rd	36294	2004	62	0,2	21	2015	0	0	0
4th	38046	2005	88	0,2	17	2017	0	0	0
All	142432	2004	385	0,3	18	2016	0	0	0
Spouses									
1st	18229	1972	198	1,1	47	2010	0	0	0
2nd	19583	1972	103	0,5	49	2010	0	0	0
3rd	19683	1972	112	0,6	47	2011	0	0	0
4th	19894	1972	101	0,5	47	2011	0	0	0
All	77389	1972	514	0,7	48	2011	0	0	0
In-laws									
1st	88035	1962	1591	1,8	55	2002	15	0	97
2nd	94123	1961	1506	1,6	54	2003	18	0	97
3rd	91993	1961	1665	1,8	54	2002	12	0	99
4th	89771	1961	1964	2,2	54	2003	13	0	95
All	363922	1961	6726	1,8	54	2003	58	0	97

Notes: ¹Mean year of birth, ²Mean age in 2020 if assumed alive, ³Mean year of last observation in RTB without a corresponding death-date. Individuals (Kin-members) who never have been registered in Sweden are not identifiable and thus not included in the study population and are not enumerated as kin or contribute to the bereavement numerator Individuals (kin-members)

who are ever observed and at some point no longer observed from the residential registers ('register över totalbefolkningen', RTB) without returning by 2020 without a death date are treated as migrated. Dates of death of overseas populations are often reported to Statistics Sweden and updated in the death registers with some lag, but such reports and/or registry updates does not always take place. Migrated individuals (and individuals treated as such) without a death-date who are older than 90 in 2020 are treated as diseased at age 90.

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