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The Socioeconomic Status of Offspring, Their Social Mobility, and the Mortality of Their Parents: An Examination of Extinct Cohorts

by

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ABSTRACT

Studies that examine connections between SES of adult offspring and mortality of older aged parents are rare. Yet, pathways that link SES and mortality implicate cross-generational social interactions as determinants. It is therefore likely that the influences of SES can be transmitted up the generational ladder, from offspring to parents. Using data on extinct cohorts from the Utah Population Database that link demographic sources, this study examines SES of offspring, their social mobility, and risks they generate for parental mortality. The sample includes over 27,000 whose children were born between 1886 and 1914. SES is operationalized as Nam-Powers occupational scores, divided into quartiles plus farmer. Weibull regressions predicting the hazard of dying are used to construct life expectancies across categories of offspring occupation conditioned on parental occupation. Results suggest offspring occupation impacts occur over and above one's own. There is a longevity penalty for those whose children have occupations in the lowest quartile and a positive cross-generation upward social mobility influence on life expectancy.

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INTRODUCTION

Socioeconomic status (SES) is one of the most robust determinants of adult and old-age mortality. Research has verified the association over decades if not centuries, in various countries and regions around the world (e.g., Antonovsky 1967; Balarajan and McDowall 1988; Fukuda, Nakamura and Takano 2004; Hurd, McFadden and Merrill 1999; Kitagawa and Hauser 1973; Mackenbach et al. 1997; Marmot, Shipley and Rose 1984; Marshall et al. 1993; Olausson 1991; Pappas et al. 1993; Sundquist and Johansson 1997; Townsend and Davidson 1982; Valkonen 2003; Zhu and Xie 2007). The association has been corroborated using various measures, a range of investigative approaches and an assortment of datasets.

The fact that length of human life varies systematically by SES provides certainly impetus for understanding the mechanisms behind the association (Braveman et al. 2010; Link et al. 2008; Queen et al. 1994). A number of perspectives have been brought to light (e.g., Adler and Rehkopf 2008; House, Lantz and Herd 2005; Kristenson et al. 2004; Lantz et al. 2001). These have proposed pathways that differentiate health across a series of psychosocial factors that are more proximate, such as access to services (Macintyre 1989), stress (Pearlin 1989), behaviors (Lantz et al. 1998; Sudhano and Baker 2006), environmental conditions (MacDonald et al. 2009) and/or social support (House et al. 1990; Krause 1997). Fundamental-cause theory (Link and Phelan 1995; Link et al. 2008) connects these pathways by suggesting that higher SES allows individuals access to more and better quality resources, be they material, social or psychological, that subsequently allow individuals to avoid risk and adopt coping strategies that lengthen life.

If access to a variety of resources explains the SES – mortality connection, it is reasonable to ask where resources originate. The literature thus far on SES and mortality almost uniformly considers own SES, which would suggest that resources are self-generating. For instance, an individual that earns a high income has a high SES, and their income allows them to purchase better health care than would be available to those with low income and hence lower SES. Similarly, high levels of education provide individuals with certain resources related to knowledge, locus of control and ability to negotiate a health care system. Is it also possible that resources like these can be exchanged across individuals within a social milieu? In the current paper we ask specifically whether SES can operate 'up the generational ladder' such that own longevity varies by SES of adult offspring. In this regard, there is a growing body of research suggesting that a network approach to health determinants is reasonable. Childhood health, for instance, is linked to SES of one's parents (Bradley and Corwyn 2002; Case, Lubotsky and Paxson 2001). More recent studies have connected early life conditions, which are a function of the characteristics of parents, to middle and older age health outcomes (Elo and Preston 1992; Galobardes, Lynch and Smith 2008; Gunnell et al. 1996; Hayward and Gorman 2004; Kuh and Wadsworth 1993; Smith et al. 2009). These latter effects remain in place regardless of whether the individual themselves has experienced social mobility. SES can therefore be transmitted 'down the generational ladder', from parent to child.

Up the generational ladder SES effects, from offspring to parents, have been less commonly explored. Research has however considered how some non-SES characteristics of offspring impact the health of their parents. For instance, health has been shown to vary according to nature and quality of social support that is provided across generations (Berkman and Syme 1979; Cornell 1992). Effects of the migration of offspring have been connected to health outcomes of parents (e.g., Krause 1997; Kuhn, Everett and Silvey 2011). Indeed, the broad social environment in which one lives and the social network within which one is connected has an impact on health outcomes (Beckett et al. 2002). As such, the current paper takes a network approach by considering the role that SES of adult offspring plays in determining the mortality of their parents. In the parlance of fundamental-cause theory, this tests the notion that offspring's resources can be leveraged over and above one's own for the purpose of improving health.

While studies that link offspring SES and parental health and mortality are rare, the few that exist are consistent with a network approach. Zimmer et al., (2007) showed that for Taiwan, where older parents tend to rely on their adult children for support, the education of offspring associates with parental mortality, mainly among parents that have a serious disease. This suggests that offspring may be helpful when it comes to purchasing health care, negotiating health care systems and coping with health problems. Other studies have confirmed these findings in places where older adults are thought to rely less frequently on their children for their old-age support. Friedman and Mare (2010) use Health and Retirement Survey data in the United States to show that the education of sons and daughters have independent influences on mortality of older parents, which is partly explained by the influence of offspring on the health behaviors of the older generation. Torssander (2013) presents similar findings for Sweden, suggesting that the influence of children on parental mortality is through a wide range of resources they can be proffered by offspring with high levels of education.

The current analysis examines the association further by using Nam-Powers occupational scores as a measure of SES and investigating simultaneously the impact of occupational status of parents and offspring on parental mortality. Employing a large United States based data source, the analysis will be the first to associate offspring SES and parental mortality for an extinct cohort (a complete cohort where all have died). There are several advantages to examining mortality amongst an extinct cohort. They lived in the late nineteenth century through to the end of the twentieth century. A study of SES and mortality during this period is illustrative since it considers a period of rapid development of health care systems, increasing life expectancies, and improving living conditions in the United States. Considering an already extinct cohort means that we do not need to allow for censoring of cases and therefore make no assumptions about mortality among those not deceased. In addition, obtaining objective information on usual occupation for both parents and offspring necessitates the use of vital or other administrative records. For instance, death certificates satisfy this requirement. Accordingly, studies of intergenerational social mobility that look at historic cohorts where all concerned are deceased provides particular advantages with respect to measurement.

We hypothesize offspring SES operates over and above parents' own SES such that *a parent that has an offspring with high SES will live longer than other parents*. We also hypothesize that *a parent with low status benefits more from high status offspring than a parent that has already attained a high status themselves* since the former involves a greater relative increase in the availability of resources. Consequently, the study will address the following research questions: Does SES level of an adult offspring affect the post-reproductive mortality experiences of their parents, over and above the impact of the parents' own SES? Does social mobility across generations (that is, offspring versus parental SES) affect the post-reproductive mortality experiences of parents?

METHODS

Data

Data come from the Utah Population Database (UPDB). This is one of the richest data sources in existence providing population-based information for demographic, genetic, and epidemiological studies. The extensive multigenerational pedigrees available in the UPDB can be used to study intergenerational effects of SES on mortality and the longitudinally linked data sets comprising UPDB are able to capture many discrete events associated with an individual. For the current study, we rely on death certificate information which provides us with dates of birth and death of the cohort under study as well as main lifetime occupation of the deceased.

Figure 1 is a schema presented to illustrate the two generation data structure used in this study. The older generation, G1, is a post reproduction parental generation. These are the individuals whose mortality experiences are being studied. The offspring generation, G2, consists of adult children of these parents. Death certificates are used to obtain information on mortality of G1 and occupation of G1 and G2. Therefore, the sample consists of individuals for whom occupation is available for both G1 and G2. The earliest year for death certificate information with recorded occupation is 1904. In order to be at least age 18 in 1904, and have a viable occupation code listed on a death certificate, an individual needs to have been born in 1886 or later. This becomes the lower bound for year of birth for G2. Using the earliest date of birth of G2 to construct a sample, we end up with a G1 sample size of 27,092 individuals born between 1844 and 1899, all of whom were deceased by 1997. This is a sample that survived to at least age 40 and therefore have theoretically completed childbirth and have at least one child with a linked death certificate. G2 consists of their adult children born between 1886 and 1915, most of who died out by the end of observation in 2012. In addition to death certificate data, this study uses information, where available, from genealogical records obtained from the Utah Family History Library, birth certificate data of the children born to the deceased or extinct cohort, and birth certificate data of the next generation, which would be their grandchildren, to construct additional measures of family structure.

Measures

Information about death and occupation is obtained from death certificates for both G1 and G2. SES is operationalized using occupation information translated into Nam-Powers SES scores (Nam and Powers 1968, 1983). Nam-Powers scores provide a number between 1 and 100 for 515 specific occupations with the score representing educational requirements and income levels typical of people that hold particular types of occupations. Thus, the higher the Nam-Powers score, the greater will be the SES standing of that individual. These scores have been used in numerous studies of SES and health (Meyer et al. 2004; Steenland et al. 2003).

Nam-Powers scores are obtained for both spouses of a marital union given available death certificates. For the parent generation (G1), or what we refer to as own occupation, the Nam-Powers score used is the highest across the married couple. In cases where one of the couple has never worked, a score will be missing. Because of this, and because of sex differences in occupations, the measure for G1 is more often based on husband's occupation. Nam-Powers scores are also obtained for all of the offspring of G1 for which there is an available death certificate. Where there is information for more than one offspring, the measure used for G2 is the highest score across siblings.

The Nam-Powers scores are categorized into occupational quartiles plus farmer. Given the birth years of the group under study, a large percentage is coded as being 'farmers'. This results in a large heaping at a score of 40, the Nam-Powers score for farmer. We suspect that 'farmer' can mean many things that are difficult to quantify with respect to other occupations. This is the reason that a separate category is created for farmers. After separating farmers from occupational distributions, the remaining scores are divided into quartiles as equally as possible. This is done separately for men and women and separately for G1 and G2. The scores that end up dividing the sample are fairly similar across sexes. The percentages in each quartile are not precisely the same because of heaping on particular values.

In addition to SES, the linked data provide access to other demographic characteristics of the extinct cohort that have been shown in the past to influence mortality and may also be related to SES of parents and offspring (Smith et al. 2009). These will be used as control variables in multivariate analysis. They include parity (first born versus other) birth year, rural residence (versus urban), non-Utah born (versus Utahan), number sons, number daughters, LDS status (members of the Church of Jesus Christ Latter-day Saints), which in Utah is an indicator of religiosity, age first child was born, age last child was born, and own sibship size. The latter is divided into categories that are generally equal in size (no siblings, 1 to 4, 5 to 7, 8 or 9 and 10 and over). Table 1 shows descriptive statistics for the variables used in this analysis.

Analysis

A number of models for the distribution of mortality were tested, including the lognormal, log logistic, Gamma and Weibull. In the end, we used a Weibull Accelerated Failure Time hazard distribution, which fit the data well. The Weibull hazard function is described as:

$$h(t)=\lambda p t^{p-1} \text{ where } \lambda = \exp(x'\beta^*).$$

x is the covariate vector and the coefficient vector β^* includes an intercept parameter μ, and *p* or a parameter that give shape to the distribution. We begin by regressing mortality on own occupation controlling for other covariates. We then add occupation of offspring. Finally, we test for interactions between own and offspring occupation. Using covariates from the Weibull distribution regression, we then calculate estimated hazard functions by age occupation of G1 and G2, adjusting other covariates at mean values. These hazards are converted into qx figures for calculation of life expectancies using standard life table functions. We report estimated life expectancies for individuals with a specific combination of own (G1) and children's generation (G2) occupation at specific ages.

RESULTS

In table 2 we present the distribution of highest occupational status of children's generation (G2) by occupation of parent (G1), which provides an indication of occupational mobility that occurred across these two historical generations. There is a fair bit of movement in occupation across the generations. For instance, looking at G1 females categorized in the lowest quartile of occupation, only 27.5% of their offspring (G2) are categorized in the lowest quartile. A very small proportion is categorized as farmer (4.3%), and the rest are in a higher occupational quartile. This means that almost 70% of the offspring generation whose parents are coded in the lowest quartile of occupation is upwardly mobile. There is also a fair bit of downward mobility. For females that are classified as being in the highest quartile of occupation, 31.2% of the offspring generation is also classified in the highest quartile, 1.9% is farmers, and the remaining 66.9% are in a lower quartile. Similar degrees of movement in occupational status across generations are found for males.

For descriptive purposes, Table 3 shows average age at death of parent by own occupation (G1) and offspring occupation (G2). Average age of death statistics are easily calculated for an extinct cohort. Since all of those in the parent generation live to age 40, average age of death minus 40 is life expectancy at age 40. There are differences in average age of death across own occupation. For females, for instance, average age of death is lowest when own occupation is farmer (72.73 years). The average age of death for females climbs steadily with rising occupational quartiles from 72.85 years for those whose occupation is in the lowest up to 75.57 years for those whose occupation is in the highest quartile. Males have lower average ages of death in comparison to females. Looking at own occupation, lowest age of death for males occurs among those in the lowest occupational quartile, while the highest age at death is for those in the highest quartile. Male farmers do relatively better than female farmers. There is also substantial variation in age of death with respect to the occupation of the offspring generation. Females whose offspring are classified in the highest quartile live longest, at 76.01 years. Males live longest if their offspring are classified as farmers, while the second longest lived among males are those whose offspring are in the highest quartile.

Weibull regression results

Table 4 presents the results of the Weibull regressions predicting the hazard of dying. Two models are presented for both females and males. The first includes own occupation (G1) plus other covariates. The second adds the occupation of the offspring generation (G2). For own and offspring occupation, the lowest quartile is omitted and other quartiles plus farmer are dummy coded and compared to lowest.

Model 1 results indicate that own occupation is predictive of age at death. Results are more robust for males in comparison to females. For females, the only significant coefficient is highest quartile. Females in the highest quartile are significantly longer lived than those in the lowest. For males, those in the second quartile, the highest quartile and farmers, are all longer lived than those in the lowest quartile.

Looking at Model 2, which adds offspring occupation, the fit of models is improved, and coefficients for G2 occupation are highly significant. For females, while offspring being a farmer is not significantly different from the lowest occupational quartile, each quartile rise in occupation increases age of death such that the longest lived females are those whose offspring are categorized in the highest quartile of occupation. Indeed, for females, mortality appears to be more robustly determined by offspring versus own occupation. Offspring occupation is also related to the hazard of mortality for males. Males with the oldest age at death are those that have children in the highest quartile of occupation.

An interaction model was tested. This interacted each of the own and offspring occupational categories. For both sexes the interaction effects did not improve the fit of the model. We therefore conclude that mortality is a function of main occupational effects only. Results for the interaction model are not shown in the table.

Other covariates are also strongly associated with age at death. For females, later birth year, being an active member of the LDS church and having either none or one to four siblings is related to higher age at death, while being the first born, living in rural areas, born outside of Utah, having a greater number of sons, having a greater number of daughters and being an inactive member of the LDS church all relate to lower age of death. For males, higher age of death is associated with being an active member of the LDS church, age at first birth and having no siblings. Lower age of death is associated with later birth year, rural residence, being non-Utah born and being an inactive member of the LDS church. All of these results generally concur with earlier research that examined early life social and demographic characteristics and mortality using these data (cite Smith et al here).

Estimation of life expectancy by own and offspring occupation

In order to provide a more intuitive understanding of the results, coefficients from the Weibull regression from Model 2 of Table 4 are employed to estimate the predicted hazard of dying by age and sex for a combination of own (G1) and children's (G2) occupation, holding all other covariates constant at their mean values. These hazards convert into a qx column for life table calculations. Using this, we estimate life table functions and derive expected years of life remaining. Results for age 40, 50, 60, 70 and 80 are shown in Table 5. For presentation purposes, shown are years of expected life at those specific ages for those categorized with a combination of highest and lowest occupational quartiles for own and offspring occupation. In other words, we show life expectancy where own and offspring occupation is lowest (Ex_{11}), own occupation is lowest and offspring is highest (Ex_{14}), own occupation is highest and offspring is lowest (Ex_{41}), and own and offspring occupation is highest (Ex_{44}). Also shown, in the last column, is the difference in the life expectancy between situations where both occupations are lowest versus both highest expressed as a percentage. For instance, at age 40 a female whose own and offspring occupation is in the lowest quartile can expect to life 31.81 more years of life. If this female's own and offspring occupation is in the highest quartile, the expected years of life increases to 34.75. This represents a 9.2% advantage in years of life for the highest quartile in comparison to the lowest.

The life expectancy results indicate that having the lowest occupational quartile and having offspring with the lowest occupational quartile is the most disadvantageous situation for both men and women across ages. The disadvantage increases with increasing age. By age 80, for instance, the advantage of being in the highest occupational quartiles is over 20% for females and over 24% for males. There is a penalty to pay regardless if offspring is in a low occupational quartile. For instance, the life expectancy at age 40 for a female that is in the highest occupational quartile but whose offspring is in the lowest is 33.40, meaning that these individuals live which is 1.35 years less than those whose offspring are in the highest quartile.

For males, there is also a life expectancy penalty for having an offspring in the lowest occupational quartile. At age 40, a male whose own and offspring's occupation is lowest can expect to live 28.68 more years. This rises to 31.42 years if their own and offspring's occupation is in the highest quartile, a difference of 9.6%. At age 40, the penalty for a male whose own occupation is highest but whose offspring is lowest is 1.68 years. By age 80, a male whose own and offspring's occupation is in the highest quartile lives 24.3% longer

CONCLUSION

Few studies have examined connections between SES of adult offspring and mortality of their parents. The studies that do exist have for the most part linked offspring education and older parent mortality (Friedman and Mare 2010; Torssander 2013; Zimmer et al. 2007). These analyses suggest that pathways that link SES and mortality implicate cross-generational social interactions as determinants. Following this line of thinking, the current study linked age at death for an extinct cohort of over 27,000 individuals with own and offspring occupation. Occupation was coded into quintiles plus farmer using Nam-Powers SES scores. A Weibull model hazard distribution regression showed a very robust impact of offspring occupation operating over and above one's own occupation. For females, offspring occupation was more robust than own occupation in predicting mortality. For males, both offspring and own occupation was predictive. Among the longest lived in this cohort were individuals whose own occupation could be classified as being in the highest quartile and whose offspring could also be categorized in the highest quartile. But, there was an advantage to having an offspring in the highest occupational quartile for those whose own occupation was low, and a penalty for having an offspring in the lowest occupational quartile for those whose own occupation was high. The combination of high occupation in both generations extended life substantially. Those with the highest quartile combination lived over 20% more years at age 80 than did those with the lowest quartile combination.

We hypothesized that offspring SES operates over and above parents' own SES such that a parent that has a child with high SES will live longer than other parents. This hypothesis was supported. We also hypothesized that a parent with low status benefits more from high status offspring than a parent that has already attained a high status themselves. This hypothesis was not supported. Interactions effects between own and offspring occupation were not statistically significant. Thus, each generation's occupational standing has its own independent influence on mortality.

Fundamental-cause theory (Link and Phelan 1995; Link et al. 2008) has often been referenced as a way to explain the link between SES and health. It suggests that higher SES allows individuals access to more and better quality resources, and these resources are put to use to avoid health risks and adopt health coping strategies. It is for this reason that those with higher SES have longer lives than those with lower SES. The evidence presented in this analysis support a network approach to fundamental cause theory. That is, SES can work up the generational ladder such that offspring SES is related to own mortality and resources come from a broad social network as well as from oneself. For instance, offspring that have high SES can help their parent access and purchase quality health care and negotiate a health care system. Health-related behaviors of an offspring could be adopted by parents, such as diet. More frequent and better quality social support will influence parental coping. What is more, parents with low SES may be in a particularly good position to benefit from the resources that can be provided by high SES offspring. For these parents, their adult children may provide a vehicle, not otherwise available, through which to obtain health related resources. This makes the mobility of offspring up the SES hierarchy of distinct importance to the mortality of parents.

There are several limitations to this study. Data are from an historical cohort. While this has advantages in terms of measurement, it may not speak to effects that are more current. It will be up to future research to determine whether the results we find can be generalized to more current cohorts. It is possible that in our sample some individuals in the younger generation could die before the older. In cases where the younger generation are deceased long before the older, there may not be a strong association between the two generations. This however is a relatively rare occurrence. For instance, if the older generation has several children and one dies at a young age, it is still likely that other children have survived to older ages. Our measure of SES for the offspring generation is determined based on the highest occupational standing of all siblings, and therefore having any one offspring provides us with a measure of occupational status. Similarly, an individual in these data may have more children than we occupational information for. Our SES measure for the offspring generation comes only from the information that we do have. Additional information on other offspring may have resulted in a higher SES.

Limitations aside, the results speak to the importance of occupational and SES mobility in determining health outcomes. Throughout many years of research, own SES has been considered as a fundamental determinant of health outcomes. Research on early life effects has suggested that some of the impact of SES is set very early in life. The fact that the SES of a broader network can function to influence mortality suggests that there is no single destiny associated with SES, but that its impacts are malleable. This helps us to understand the mechanisms behind the SES – health association. There are possible interventions that can occur throughout life to alter the fate and the advantage of those with higher SES. Educating children, for instance, so that they move up the occupational ladder will pay dividends later in life. Resources that SES makes available are not be set in stone early in life and are changeable even in older ages.

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Figure 1: Two generation data structure used in this study

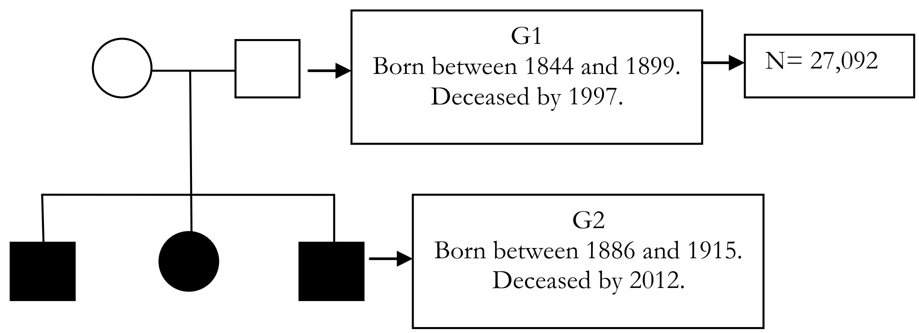

Table 1: Variable descriptive

	Females		Males	
	Mean or Percent	Standard deviation	Mean or Percent	Standard deviation
N	12,752		14,340	
Own Occupation				
Lowest quartile	14.30%		13.85%	
Second	10.77%		10.98%	
Third	15.62%		16.10%	
Highest quartile	16.01%		15.95%	
Farmer	43.29%		43.12%	
Child generation occupation				
Lowest quartile	21.99%		23.21%	
Second	23.97%		23.95%	
Third	26.54%		25.66%	
Highest quartile	20.80%		19.75%	
Farmer	6.70%		7.43%	
Covariates				
First born	32.24%		36.46%	
Birth year	1872.3	7.46	1868.1	9.30
Rural residence	27.25%		29.39%	
Non-Utah born	18.32%		18.49%	
Number sons	2.85	2.10	2.71	2.09
Number daughters	2.75	2.11	2.61	2.10
Active LDS	63.42%		53.40%	
Inactive LDS	14.74%		16.62%	
Non LDS	21.84%		29.98%	
Age at first birth	23.77	4.82	28.38	6.95
Age at last birth	35.03	6.62	38.90	8.56
Number siblings				
None	17.46%		23.08%	
One to Four	16.48%		16.62%	
Five to Seven	22.77%		21.01%	
Eight to Nine	19.54%		18.05%	
Ten +	23.75%		21.23%	

Table 2: Distribution of child generation occupation by own occupation and sex

	Own occupation (G1)					
Offspring occupation (G2)	Lowest quartile	Second	Third	Highest quartile	Farmer	Total
			Females			
N	1,824	1,374	1,992	2,042	5,520	12,752
Lowest quartile	27.5	24.8	22.4	18.4	20.7	22.0
Second	28.5	25.6	25.5	19.9	23.0	24.0
Third	23.5	26.5	27.1	28.6	26.6	26.5
Highest quartile	16.2	20.0	22.4	31.2	18.1	20.8
Farmer	4.3	3.1	2.7	1.9	11.6	6.7
Total	100.0	100.0	100.0	100.0	100.0	100.0
			Males			
N	1,986	1,574	2,309	2,287	6,184	14,340
Lowest quartile	29.2	26.6	24.4	18.9	21.6	23.2
Second	28.0	26.3	25.9	20.6	22.6	24.0
Third	23.3	24.7	26.0	28.1	25.6	25.7
Highest quartile	14.9	18.8	20.9	30.6	17.1	19.7
Farmer	4.7	3.7	2.8	1.9	13.0	7.4
Total	100.0	100.0	100.0	100.0	100.0	100.0

Table 3: Average age of death by own and child generation occupation, by sex (standard deviation in parentheses)

	Females	Males
Own occupation (G1)		
Lowest quartile	72.85 (13.67)	70.92 (12.69)
Second	74.22 (13.12)	71.11 (12.59)
Third	74.78 (12.97)	72.00 (12.40)
Highest quartile	75.57 (13.03)	72.79 (12.25)
Farmer	72.73 (13.32)	72.68 (11.88)
Offspring occupation (G2)		
Lowest quartile	73.87 (13.11)	69.68 (12.71)
Second	73.80 (13.74)	71.45 (12.24)
Third	74.47 (12.99)	69.71 (12.74)
Highest quartile	76.01 (13.11)	72.17 (12.50)
Farmer	73.76 (13.23)	73.08 (12.13)

Table 4: Weibull regression results

	Females		Males	
	Model 1	Model 2	Model 1	Model 2
Own occupation (G1)				
(Lowest quartile comparison)				
Second	0.0057	0.0041	0.0385**	0.0381**
Third	0.0167	0.0141	0.0027	0.001
Highest quartile	0.0381**	0.0332**	0.0627**	0.0591**
Farmer	0.0032	0.0035	0.0704**	0.0698**
Offspring occupation (G2)				
(Lowest quartile comparison)				
Second		0.0235**		-0.0042
Third		0.0297**		0.0108**
Highest quartile		0.0370**		0.0221**
Farmer		0.0032		0.0082
First born	-0.0184*	-0.0185*	-0.0025	-0.0022
Birth year	0.0013*	0.0011^	-0.0027**	-0.0027**
Rural residence	-0.0273**	-0.0246**	-0.0202**	-0.0199**
Non-Utah born	-0.2188**	-0.2161**	-0.3223**	-0.3216**
Number sons	-0.0066**	-0.0069**	-0.0024	-0.0025
Number daughters	-0.0041**	-0.0047*	-0.0001	-0.0002
Active LDS	0.0498**	0.0467**	0.0584**	0.0566**
Inactive LDS	-0.0305**	-0.0313**	-0.028**	-0.0281**
Age at first birth	0.0006	0.0006	0.0039**	0.004**
Age at last birth	0.0015	0.0011	0.0007	0.0006
Number siblings (5-7 comparison)				
None	0.0438**	0.0444**	0.0352**	0.0355**
One to Four	0.0228*	0.0222*	0.0051	0.0049
Eight or nine	0.0138	0.013	0.0006	0.0002
Ten +	0.0098	0.01	-0.0067	-0.0065
Constant	1.1175	1.5069	8.4568	8.4997
Scale	0.3544	0.3541	0.3466	0.3465
Shape	2.8217	2.8237	2.8850	2.8859
-2 LL	16192.70	16134.97	16989.98	16939.16

Table 5: Estimated life expectancies at selected years, by selected levels of own and children's occupation, by sex[1]

	Age	Ex_{11}	Ex_{14}	Ex_{41}	Ex_{44}	Δ % $Ex_{11} - Ex_{44}$
Females	40	31.81	33.40	33.02	34.75	9.2
	50	22.54	24.08	23.71	25.39	12.6
	60	15.56	16.91	16.59	18.07	16.1
	70	10.78	11.88	11.61	12.83	19.0
	80	7.55	8.38	8.18	9.09	20.4
Males	40	28.68	29.74	30.29	31.42	9.6
	50	19.47	20.50	21.02	22.11	13.6
	60	12.79	13.67	14.13	15.08	17.9
	70	8.46	9.16	9.53	10.30	21.6
	80	5.73	6.26	6.54	7.12	24.3

1. Ex_{11} is life expectancy at age x for those whose own and children's generation occupation is in the first or lowest quartile. Ex_{14} is life expectancy at age x for those whose own occupational quartile is in the first or lowest and children's generation occupational quartile is the fourth or highest. Ex_{41} is life expectancy at age x for those whose own occupational quartile is in the fourth or highest and children's generation occupational quartile is the first or lowest. Ex_{44} is life expectancy at age x for those whose own and children's generation occupation is in the fourth or highest quartile. Δ % Ex_{11} – Ex_{44} is the percent change in life expectancy between E_{11} and E_{44}.