Supporting Information Appendix for The Intergenerational Transmission of Paternal Trauma among US Civil War Ex-POWS

by

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1 Data

The veterans whose children we study are drawn from two different longitudinal samples constructed from hand written military service and pension records (including detailed examining surgeons' exams), preserved in the National Archives, and from manuscript census schedules. The first sample is of 39,388 men in 330 randomly drawn Union Army volunteer infantry companies, collected by the program project, Early Indicators of Later Work Levels, Disease, and Death (NIA P01 AG10120, PI: Fogel). This sample is representative of the Northern population of military age in 1860 in terms of socioeconomic status (Fogel 1993). and will be referred to as the original Union Army sample. We restricted this sample to men who survived to 1900. The second sample, collected by the project Environmental Stress, Social Networks, and Older Age Health and Mortality (NIA R01 AG027960, PI: Costa), is of 1,041 ex-POWs imprisoned at the most notorious Confederate POW camp, Andersonville, and who survived until 1900. The men were randomly drawn from a list of Andersonville prisoners of war compiled by the National Park Service and will be referred to as the Andersonville sample. We did not collect the records of men from the National Park Service list whose POW status could not be confirmed in military or pension records. The National Park Service list has a survivor bias, probably because the volunteers who compiled the list used postbellum accounts, among other sources. Details about the samples are provided in on-line codebooks, available at uadata.org (where the data are available), and also in Costa et al. (2017) and Costa (2012).

The military service and the pension records that comprise the original Union Army and Andersonville samples contain enlistment information, including occupation, place of

enlistment, and height, and also wartime experiences such as illnesses and wounds, POW experience, and length and location of service. The Union Army pension records exist because in 1862 Congress established a program to provide pensions for soldiers who had incurred permanent bodily injury or disability while in the service and for the dependents of soldiers who had died from causes that could be traced directly to injuries received or diseases contracted while in Union Army service. The pension program effectively became a universal disability and old age pension program in 1890 and the number of veterans on the rolls doubled. Exams from a board of surgeons provide detailed post-war data, which permit disease diagnoses based on specific conditions, symptoms, or signs. Physicians who have examined these records report that they could not do better in the field without modern diagnostic equipment. (For a more thorough discussion of how these records can be used in analysis and potential biases see Costa 2000, 2002 and Costa et al. 2007).

The veterans' children are being linked to death records and manuscript census schedules which provide occupational, residential, and family information under the program project Early Indicators, Intergenerational Processes, and Aging (NIA P01 AG10120, PI: Costa). Veterans are being linked to any census or death record information not previously collected and the children's mothers are being linked to their childhood censuses.

The project is collecting the records of the children of 8,500 non-POWs who survived to 1900 and of 1,999 former POWs who survived to 1900. The ex-POWs are all ex-POWs from the original Union Army and Andersonville samples. The records of the children of all ex-POWs have been collected, but collection of the records of non-POW children is still on-going. The non-POWs used in this project are drawn from 7,810 non-POWs, whose

childrens records already have been cleaned and coded. Only the children of veterans who survived until 1900 were traced because information in the pension records is needed to link children to death records and manuscript census records but only in 1900 was pension coverage close to universal. However, the biases introduced by not examining veterans who survived the war but died before 1900 appear to be minimal because our inability to find them in the 1870 and 1880 censuses suggests that most excess deaths among ex-POWs were before 1870.

Table S1 describes the numbers of ex-POWs and non-POWs in the original samples and the main sample. Observations are omitted from the original samples because 12% of ex-POWs and 9% of non-POWs had no children (or no children who were recorded). Among both ex-POWs and non-POWs there was no difference in the number of children (5.2 each), as determined from the pension records and the censuses. The difference in number of children by paternal ex-POW status is negligible after restricting the sample to children who were born after the war, who have a known death date, and who survived to age 45: 3.3 children per ex-POW veteran versus 3.1 per non-POW veteran.

Information on veterans' children was obtained from veterans manuscript census schedules which list all members of the household and from family circulars which were part of the veterans pension file (and would have been completed by all of the veterans in the sample). The family circulars contain child names, birth and death dates and often daughters' married names. Table S2 shows that the linkage rate to the 1880 census, when many of the children would have been young (the mean year of birth for children was 1878), was 93%. Linkage rates were high in other census years as well.

All of the veterans' children were linked to on-line death records and to all of the

manuscript census schedules from 1850 to 1940, with the exception of 1890 which is unavailable, using familysearch.org, ancestry.com, Find A Grave, and deathindexes.com. Death sources are available in some form on-line for all 50 states. Each state varies in the types of death information and dates available. Sometimes information is provided only by the individual counties. A listing of availability is provided by deathindexes.com.

Table S2 shows that 74% of children were linked to death records. Among children with death records, sons are slightly over-represented with 1.08 sons for every daughter. The availability of on-line death records is the primary determinant of linkage to death records. Children are likely to be missing death dates if they died before death registration systems in their state or county were established and their death dates are not listed in the veterans' pension record. Characteristics of the father at enlistment such as size of city of enlistment and his occupation, paternal ex-POW status, and child sex explain only 1% of the variance in the linkage rate. (Of these variables, the main predictor was whether a father enlisted in a large city.) Adding child state of birth dummy variables, an indicator of death record availability, increases the variance in finding only to 12%.

Early childhood socioeconomic and geographic information is available from the census and thus, based on linkage rates, is known for roughly 93% of the children. Linkage rates to the census for children are highest for 1880, when most of them were in their fathers' households (mean year of birth is 1877), and fall as they start to establish independent households. linkage rates for children not known to be dead suggest that many of those with unknown death dates were probably dead at the time of the census.

We also examine two additional samples drawn from the same original data sources: the veteran fathers and the children's mothers alive in 1900 (the same year all fathers were

alive) and families with same-sex children born before and after the war. In analyzing the mortality of children's mothers, we trim the top and bottom 1% of the age distribution in 1900.

Table S3 compares life expectancy among the veterans' children with other cohort life tables. Life expectancies for children of veterans and non-veterans were similar. The large differences at ages 20 and 30 with the genealogical database compiled by Pope (1992) suggests that deaths prior to age 40 or 50 probably are understated, particularly for women. The data therefore are best suited to examining mortality at older ages. Life expectancies for the children of Non-POWs and ex-POWs were similar. As expected, life expectancies of the children's fathers and mothers is higher than observed in period life tables (see Table S4), which draw from more urban populations and include the foreign-born.

2 Variables

Ex-POWs are grouped into two: those who were captured during the prisoner exchange period (before July 1863 or after June 1864) and those who were captured during the non-exchange period (captured between July 1863 and June 1864). This grouping reflects both time spent in captivity and conditions at the time of capture. Most POWs were exchanged immediately until mid-1863 when prisoner exchanges stopped as the two sides argued over the terms, particularly the treatment of black soldiers (who could be re-enslaved) and their white officers (who could be hanged as leaders of a slave insurrection). Exchanges began again in December of 1864. In the original Union Army sample, the mean number of days spent in prison until death or release for men who were captured prior to mid-1863 was

20; for men who were captured after mid-1863, it was 92 days. Men captured after mid-1863 faced ever worsening conditions as the crowds of prisoners increased. Four percent of men captured before July of 1863 died in captivity, whereas 27% of those captured July 1863 or later died in captivity (Costa 2012; Costa and Kahn 2007).[1] Among survivors to 1900 in the original Union Army sample, wartime records mention scurvy for 11% of all non-POWs; 14% of POWs captured before July 1863; 23% for POWs captured between July 1863 and July 1864; and 14% for POWs captured after June 1864 (Costa 2012).

The main outcome of interest for the children of veterans is years lived, calculated from death dates as provided in the death records and from median year of birth using pension and census records which provide either year of birth or age and record year. Cause of death is available for roughly a quarter of the children of veterans with information on years lived. Availability is largely determined by whether states have made this information available on-line. We categorized causes of death into broad groups. These groups are not exclusive and thus allow for multiple causes of death. Table S5 shows these causes for the children of veterans born after 1865 who survived to age 45.

The main explanatory variables are paternal ex-POW status. We classified ex-POW status as non-POW, POWs during the exchange period (captured before July 1863 or after June 1864), and POW during the non-exchange period (captured between July 1863 and June 1864). Non-POWs are the reference group in all analyses. Because responses to stress may vary by sex, we interacted paternal ex-POW status with a dummy variable equal to 1 if the child was a daughter.

In addition to paternal ex-POW status, explanatory variables include a dummy variable

[1] In contrast, the total wartime mortality rate was 14%.

equal to one if the data was from the Andersonville sample, a dummy variable equal to one if the child was a daughter, birth year, paternal characteristics at enlistment and in 1880, as well as family characteristics. Paternal characteristics at enlistment were obtained from military service records and were father's occupational category at enlistment (laborer, artisan, and professional or proprietor with farmer as the omitted category), a dummy variable if the father had been wounded during the war, dummy variables indicating US birth and Irish birth (the Irish faced higher older-age mortality rates than the native-born or other foreign-born), and a dummy variable indicating whether the father enlisted in a city of 50,000 or more. There were 13 cities of this size in 1860 and all were high mortality cities. Post-war control variables are the number of siblings, birth order, a dummy variable indicating if the father had any additional property wealth in 1870, and county density in 1880 (a measure of urbanization). The number of siblings and birth order are calculated from the full sample, that is, they are not restricted to those with death information who survived to age 45. We use father's farm occupation in 1880 as an additional stratification variable and non-farm occupational class categories in 1880 as control variables. For sons alive in 1910, we stratify on his farm occupation and paternal enlistment year and control for all previous variables as well as own non-farm occupational categories and marital status in 1910. For married daughters in 1910, we stratify on her husband's farm occupation and paternal enlistment year and control for all previous variables as well husband's non-farm occupational categories.

We also include maternal characteristics as explanatory variables: maternal lifespan and maternal grandfather's real estate wealth, as recorded in the 1850 and 1860 censuses. We use the logarithm of maternal grandfather's real estate wealth, taking either real estate

wealth in 1850 or in 1860 when the 1850 value is unavailable. We deal with missing information on maternal grandfather's real estate wealth by creating a dummy variable equal to one if we have no information on real estate wealth and setting the value of real estate equal to 0.1. When maternal lifespan information is missing (less than 5% of the sample) we set maternal lifespan to 15 and include a dummy variable equal to one if information on maternal lifespan is missing. We stratify on paternal enlistment year, paternal farm occupation in 1880, mother living to age 80, and no information on real estate wealth.

Information on parental and child socioeconomic, family and household characteristics were obtained from the censuses. The original data were direct transcriptions from the manuscript census schedules and thus all variables such as location and occupation were standardized and coded. When census derived variables are used as controls missing observations are included in the analysis by including a dummy variable equal to one if the observation is missing and setting the value of the variable equal to zero.

Table S6, shows that mean years lived were lower among the sons but not the daughters of former non-exchange period POWs compared to exchange period ex-POWs and non-POWs. (By ex-POW status, men in the Andersonville sample lived on average one year longer than men in the Union Army sample.) The characteristics of the children of non-exchange period ex-POWs differed from those of other ex-POWs and non-POWs. Fathers who were non-exchange period ex-POWs were less likely to be farmers at enlistment and were more likely to be laborers than other ex-POWs or non-POWs. After the war they remained less likely to be farmers and were more likely to be artisans. Because their fathers were less likely to be farmers, the children of non-exchange period ex-POWs were

more likely to be in a more urbanized county in 1880.

3 Mortality in the Union Army and Andersonville Samples

Figures S1, S2, S3, and S4 present Kaplan-Meier curves for all 25,563 children of veterans born after the war who survived until age 10 by paternal ex-POW status, sample and by sex. In the original Union Army sample, the sons, but not the daughters, of no-exchange period ex-POWs were less likely to survive after age 10 beginning roughly at age 50. There was no difference between the sons of exchange period ex-POWs and non-POWs. In the Andersonville sample, the difference between sons by type of paternal ex-POW status is minimal around age 50 though, in general, the sons of no-exchange period ex-POWs fared worse. Also in that sample, there is a survival difference between daughters by type of paternal ex-POW status.

Among children surviving to age 45, mean years lived was lowest (70.98) among the sons of no-exchange ex-POWs (see Table S7). In the Union Army sample there was a difference of over a year between the sons of no-exchange ex-POWs and the sons of exchange ex-POWs and non-POWs. The difference by ex-POW status was smaller in the Andersonville sample. There was little difference between daughters in the Union Army sample by paternal ex-POW status, but the difference was over a year in the Andersonville sample.

Table S8 shows that combining the Union Army and Andersonville samples in a Cox

proportional hazard model of years lived, controlling for birth year and paternal enlistment characteristics and stratifying on paternal enlistment year, increases power but leaves the magnitudes unchanged relative to results obtained from the original Union Army sample. In the Union Army sample alone, the sons of no-exchange period POWs were 1.122 times more likely to die than the sons of non-POWs and 1.073 ($\hat{\sigma}$ =0.069, $p > |z|$ =0.273) times more likely to die than the sons of exchange-period POWs. When we looked at the Andersonville sample only, we found that the sons of no-exchange period ex-POWs were 1.105 times more likely to die relative to exchange period POWs ($\hat{\sigma}$ =0.069, $p > |z|$ =0.110). The comparable hazard ratio for daughters was 1.118 ($\hat{\sigma}$ =0.066, $p > |z|$ =0.060), again contrasting with the results obtained for daughters in the Union Army sample.

Table S9 shows that the main findings are robust to different assumptions about the mortality of those children with missing date of death. The specification is a probit model in which the dependent variable is a dummy equal to 1 if the child died before age 80 and the variables of interest are paternal ex-POW status. Known deaths before age 45 are excluded. Separate regressions were run for sons and daughters, controlling for birth year, the father's occupational class at enlistment, a dummy if the father enlisted in a city of more than 50,000 individuals, a dummy if the father was wounded, an indicator if the father was native-born, a dummy if the father was Irish-born, dummy variables for year of enlistment, and an indicator if the data were from the Union Army sample.

4 Proportional Hazards Assumption

We stratify on father's enlistment year because in the Union Army sample a single hazard ratio describing the effect of enlistment year is inappropriate. Table S10 presents the covariate-specific tests of the proportional hazards assumption for the main specification (the second regression in Table S8 in this Appendix) which stratifies on enlistment year and controls only for birth year and paternal enlistment characteristics. When we add controls for post-war paternal characteristics, we reject the proportionality assumption unless we also stratify on father's farm occupation in 1880. We cannot add controls for occupational class in 1910 without violating the proportionality assumption. We therefore stratify on father's enlistment year and on son's (or son-in-law's) farm occupation in 1910. Our results are consistent with differing mortality patterns among farmers and non-farmers.

5 Socioeconomic Status and Family Structure

We constructed additional socioeconomic and family measures both as additional controls and to examine the impact of paternal ex-POW status on sons' socioeconomic status and family arrangements. These were an indicator of school attendance in 1880 for school age sons (ages 5-14), the highest grade completed for those who survived to the 1940 census, son's occupational class in 1910 and 1920, an indicator of homeownership in 1910 and 1920 for household heads, a dummy variable indicating if the son when age 21+ was living in the same county as the father in 1900, marital status in 1910 for children at least 21 years of age, and an indicator if the child was ever divorced for those who were ever

married.

We examine the impact of paternal ex-POW status on 1) sons' socioeconomic status by using a multinomial logit model to estimate the impact of paternal ex-POW status on the occupational class of the son in 1910 and 1920; 2) the occupational score of non-farmers in 1910 and 1920 using OLS; 3) school attendance in 1880 of children age 5-14 using a probit model; 4) whether the son was in the same county as the father in 1900, whether the son was a household head in 1910, and whether the son was married in 1910, all among sons age 21+ at the time of the census, using a probit model; 5) whether the son was ever married and, if ever married, ever divorced, using a probit model; and, 6) the highest grade completed by the child as recorded in the 1940 census using OLS. We control for birth year and paternal enlistment characteristics and cluster the standard errors on the family level.

Paternal ex-POW status had a negligible impact on sons' socioeconomic status (see Table S11). The sons of no-exchange period ex-POWs were statistically significantly less likely to be famers in 1920, but the effect disappears controlling for paternal occupation in 1880. The sons of no-exchange ex-POWs were statistically significantly more likely to be homeowners in 1920, conditional on being household heads, but there was no impact on homeownership in 1910.

Paternal ex-POW status also had little impact on sons' family structure (see Table S11). Paternal ex-POW status did not affect whether sons were living close to home in 1900 (chosen because all fathers were alive in 1900) nor whether they were married. Conditional on ever being married, the sons of no-exchange period ex-POWs were statistically significantly less likely to be divorced but given the small number of divorced sons, this

result should be interpreted with caution.

6 Marriage Quality

We investigate marriage quality by examining whether the veteran's ex-POW status was correlated with his father-in-law's wealth (value of real estate and personal property) in pre-war censuses. We restrict ourselves to examining the mothers of all children who survived to age 45 and who were linked to either their 1850 or 1860 households (3,043 mothers in 1850 and 2,715 in 1860). We create a variable for father-in-law's real estate wealth, which is real estate value either in 1850 or in 1860 when the 1850 value is unavailabe. We also use father-in-law's personal property wealth in 1860.

We run separate median regressions where the dependent variables are the logarithm of father-in-law's real estate wealth and the logarithm of father-in-law's personal property wealth. The independent variables are dummies for paternal POW status, if wounded, occupational class at enlistment, enlistment in a city of 50,000 or more, year of enlistment, Irish birth, and US birth. We run regressions for all marriages and for first marriages known to have occurred after the war.

Veterans' ex-POW status was uncorrelated with their wives' family wealth. However, wounded veterans married poorer wives (see Table S12).

7 Parental Mortality

We examine the impact of veteran ex-POW status on the mortality of veterans and their wives using separate Cox proportional hazard models. The sample is restricted to fathers and mothers of children surviving to age 45. For the father we examine years lived since 1900 (his start date in the sample) and for mothers we examine years lived since the birth of her first child (her start date in the sample), regardless of child death or availability of child death date information. We control for veteran ex-POW status (our primary variable of interest), wounded, and enlistment characteristics in both regressions and for age in 1900 in the father's regression and age at the birth her first child in the mother's regression. In addition, we stratify on first birth below age 20, age 20-34, and age 35 or over in the mother's regression to satisfy the proportionality assumption. (The stratification is consistent with higher maternal mortality at young and old ages and with selection in age at first and last birth.)

No-exchange period ex-POWs alive in 1900 were 1.14 times more likely to die than non-POWs, an effect slightly greater than that observed in Costa (2012). In contrast, the longevity of the children's mothers in 1900 was unaffected by their husbands' ex-POW status (see Table S13).

Table S14 shows that, among children with information on parental lifespans, adding maternal lifespan does not change the main results. (We controlled for missing maternal lifespan as discussed above). Adding paternal lifespan leads to a slight decrease in the hazard ratio on paternal no-exchange period ex-POW, as would be expected given the correlation between fathers' years lived and ex-POW status.

8 Magnitudes

The magnitude of the impact of paternal POW status can be assessed from Table S15, which shows selected correlates of mortality from the Cox proportional hazard regressions. The impact of paternal ex-POW status during the no-exchange period was roughly comparable to the effect of urban residence (highly deadly in this time period) and low socioeconomic status.

9 Causes of Death

We examine excess mortality by cause for the 26% of children surviving to age 45 with available cause of death information by fitting Cox proportional hazard models of time until death from a specific cause, with the standard errors clustered at the family level and stratified on enlistment year. Causes of death are multiple, not competing, and the control variables are paternal ex-POW status, wounded, birth year and paternal enlistment characteristics.

Excess mortality among the sons (but not the daughters) of ex-POWs was from cancer and cerebral hemorrhage (see Table S16). Although in the small sample with cause of death information, ex-POW status did not have an impact on all cause mortality, sons of ex-POWs during the exchange period were 1.4 and 1.8 times more likely to die from cancer and cerebral hemorrhage than the sons of non-POWs. Paternal ex-POW status did not affect the hazard rate from the small combined category of accidents and suicides.

10 Season of Birth

When we examine the impact of individual month of birth on longevity among the children of non-POWs, we find stronger effects for women than for men (see Figure S5 and Table S17), consistent with the findings of Gavrilova et al. (2003) for the European nobility in the nineteenth century. We find that December was best month for men to be born in whereas October was the best month for women, again consistent with the findings of Gavrilova et al. (2003) who also find a sharp discontinuity between months for men. Paternal no exchange ex-POW status accentuates the relationship between month of birth and mortality for sons (see Figure S6).

Researchers have interpreted quarter of birth effects as reflecting inadequate nutrition, citing the lower birth weights of children born in the second relative to the fourth quarter and the absence of fresh fruits and vegetables in winter and spring in the past (Doblhammer and Vaupel 2001). For example, a study from 1939 reported that vitamin levels were at their lowest in the spring (Beardsley 1989: 204).

An alternative explanation for quarter of birth effects is that they reflect social class differences. However, quarter of birth effects are observed even within families with more than one son (see Table S18), suggesting that quarter of birth effects are not driven by socioeconomic factors.

Another explanation for quarter of birth effects is that children born in the second quarter experienced parasitic diseases in summer when very young and viral disease in winter in-utero. Because infectious diseases were more prevalent in more densely populated counties, we would expect that quarter of birth effects would be stronger in more

densely populated areas. However, as Table S19 shows, interactions between quarter of birth and birth county population density, as proxied by census residence when young, are insignificant.

Seasonal indices of wholesale food prices (none of which include any fresh fruit or green vegetables) show that food prices were higher in the winter months (see Figure S7). The hazard ratios for sons' month of birth effects are most strongly correlated with seasonal indices based on Warren and Pearson's (1932) farm food prices and seasonal indices based on White's (1935) series for all foods, livestock, and grain.

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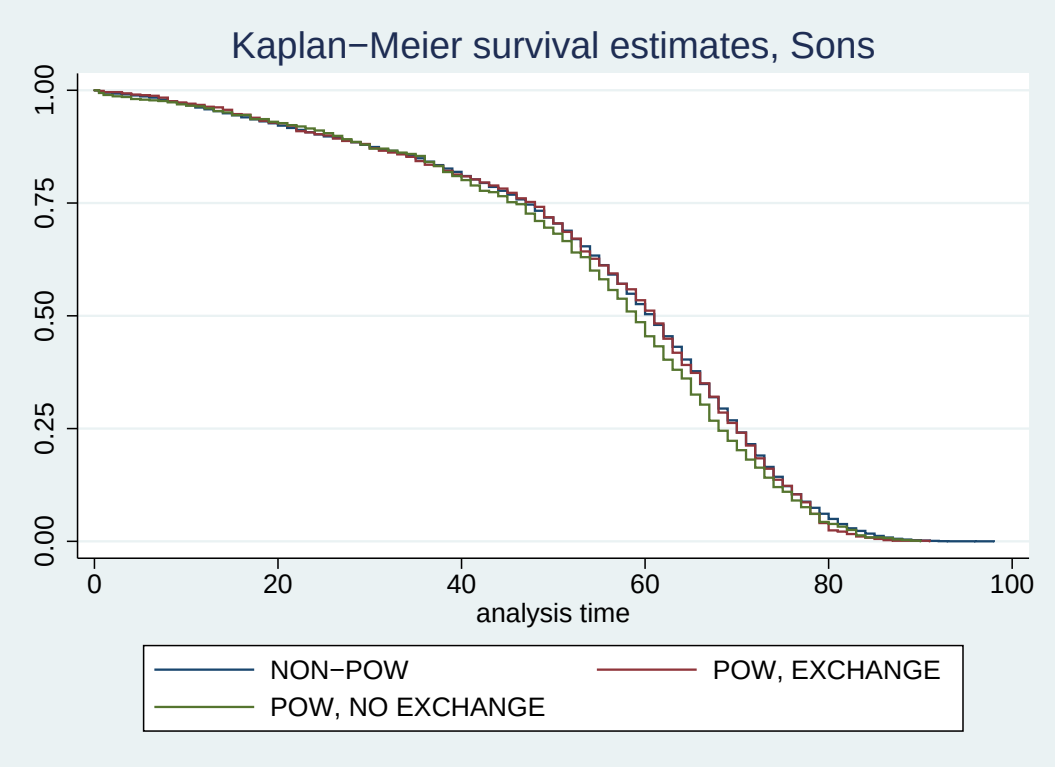
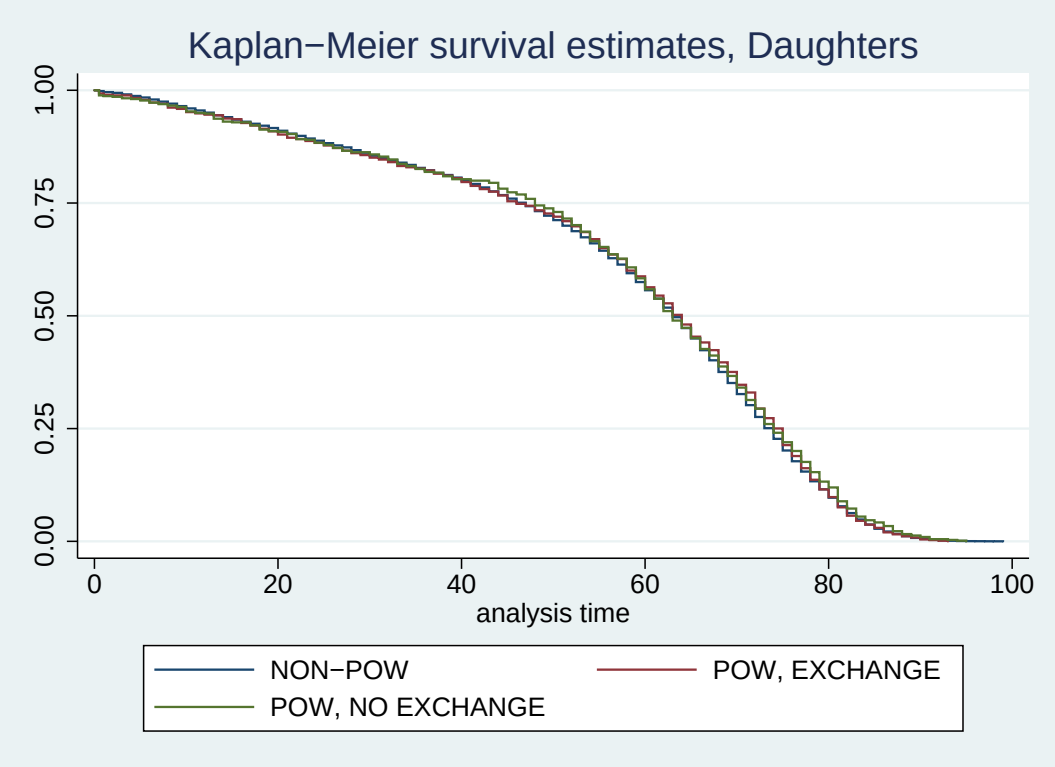
Figure S1: Kaplan Meier Graph for Sons in the Union Army Sample Who Survived to Age 10



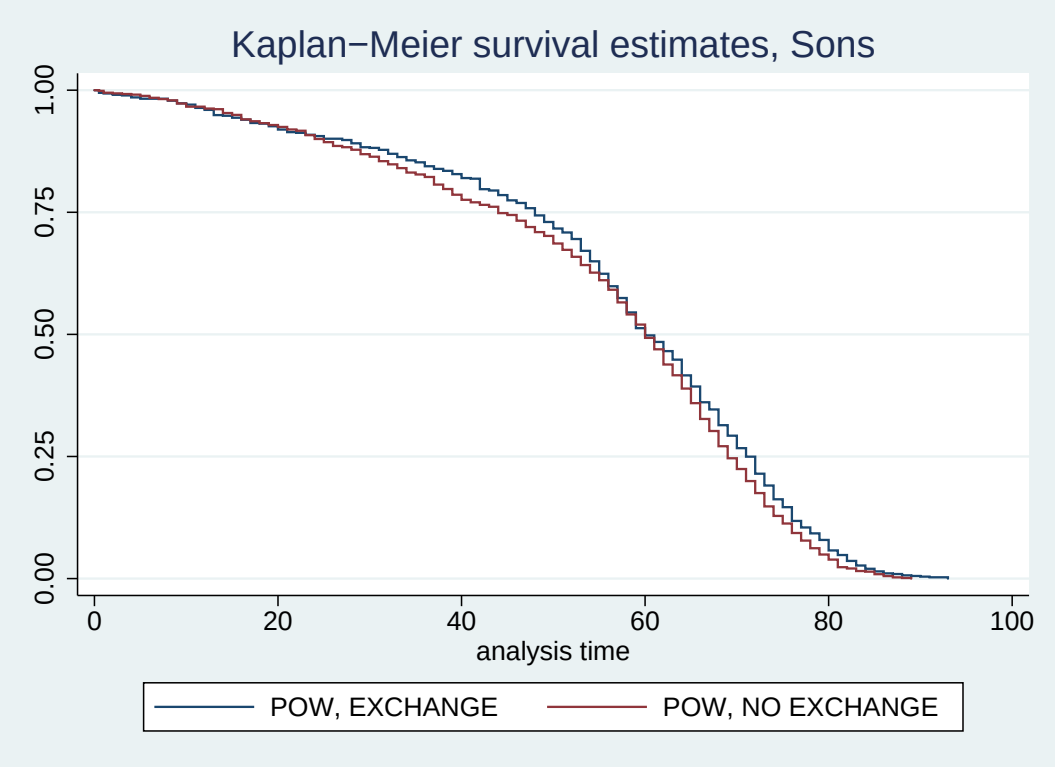
10,785 sons born after the war, 673 with no-exchange ex-POW fathers, 739 with exchange ex-POW fathers, and 9,373 of non-POW fathers.

Figure S2: Kaplan Meier Graph for Daughters in the Union Army Sample Who Survived to Age 10



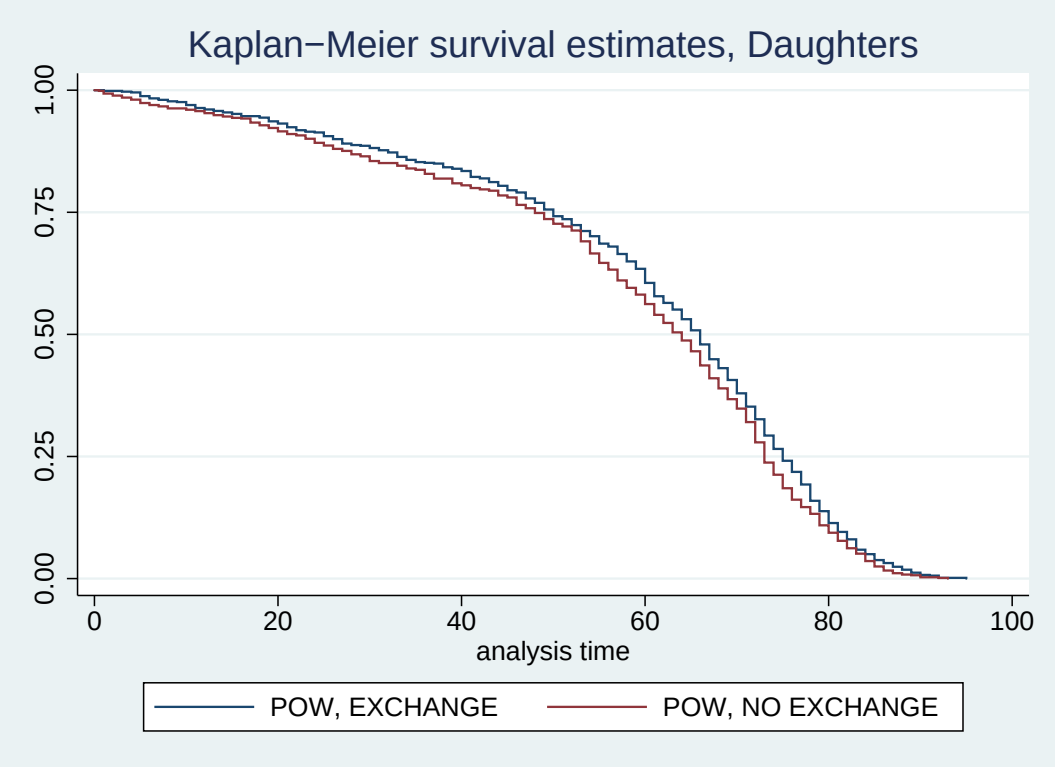
9,879 daughters born after the war, 619 with no-exchange ex-POW fathers, 703 with exchange ex-POW fathers, and 8,557 with non-POW fathers.

Figure S3: Kaplan Meier Graph for Sons in the Andersonville Sample Who Survived to Age 10



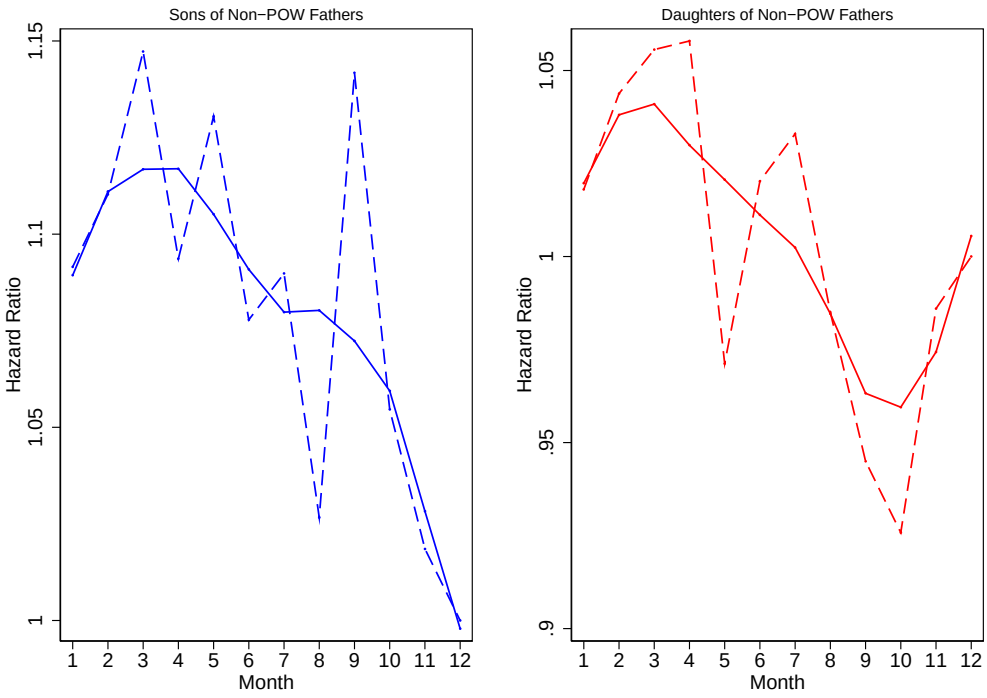
1,516 sons born after the war, 771 with no-exchange ex-POW fathers and 745 with exchange ex-POW fathers.

Figure S4: Kaplan Meier Graph for Daughters in the Andersonville Sample Who Survived to Age 10



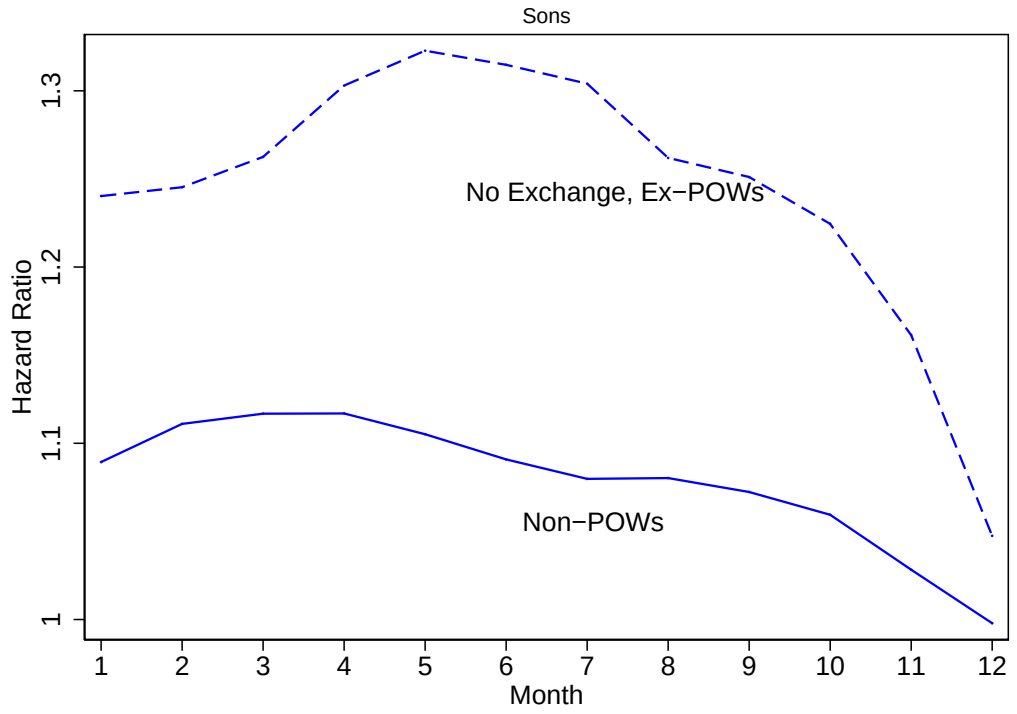
1,383 daughters born after the war, 724 with no-exchange ex-POW fathers and 659 with exchange ex-POW fathers.

Figure S5: Month of Birth Effects, Sons and Daughters of Non-POWs



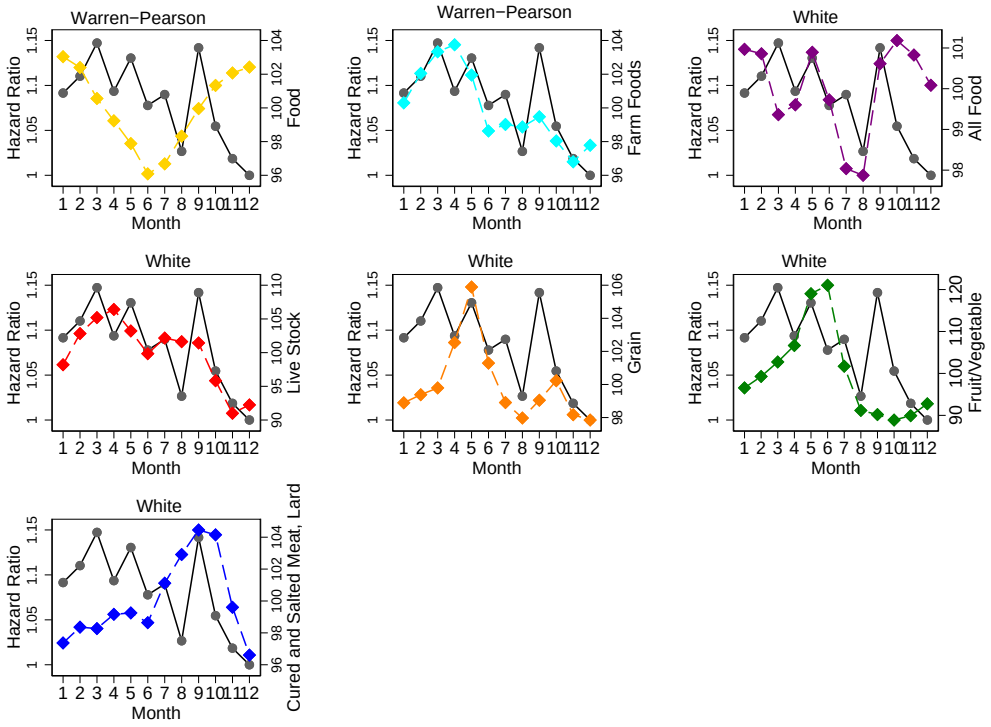
Month of birth hazard ratios are estimated from separate cox regressions for each sex where additional controls are as in Equation 1. All hazards are relative to December and were smoothed using a lowess estimator with a bandwidth of 0.6.

Figure S6: Month of Birth Effects, Sons of Non-POWs and No Exchange, Ex-POWs



Month of birth hazard ratios were estimated from separate cox regressions by paternal ex-POW status where additional controls are as in Equation 1. All hazards are relative to December and were smoothed using a lowess estimator with a bandwidth of 0.6.

Figure S7: Month of Birth and Seasonal Food Effects, Sons of Non-POWs



Month of birth hazard ratios (relative to December) for sons of non-POWs are estimated from a cox regression where additional controls are as in Equation 1. The seasonal indices for the first two figures were calculated for the years 1865-1914 from the indices in Warren and Pearson (1932). Farm products are barley, corn, oats, rye, wheat, rice, beans, potatoes, butter, fowls, cows, steers, beef, sheep, hogs, and pork. The seasonal indices for the remaining panels were calculated for the years 1865-1914 from the indices in White (1935).

Table S1: Sample Design

	Veterans (Survived to 1900) Veteran		Veterans' Children Father	
Sample	Ex-POW	Non-POW	Ex-POW	Non-POW
Initial	1,999 (12% no children)	7,810 (9% no children)		
With Children	1,768 (5.2 children/vet)	7,084 (5.2 children/vet)	9,237	37,125
Children Known Death Date and Survived to Age 10 and Born Post-War and Father Age 18+ in 1865	1,503 (3.7 children/vet)	5,163 (3.5 children/vet)	5,633	17,930
Children Survived to Age 45	1,447 (3.3 children/vet)	4,920 (3.1 children/vet)	4,758	15,145

Table S2: Linkage Rates to Census and Death Information for Veterans (Survived to 1900) and their Children Born After 1866

	Veterans Living in Census Year	Children Not Known to be Dead	Children Alive, Year of Death Known
Death records	99.9	73.7	100.0
Census (born before census)			
1850	75.0		
1860	78.2		
1870	83.6	78.0	79.7
1880	95.2	88.9	93.0
1900	95.6	78.8	89.4
1910	96.0	73.4	88.0
1920	92.4	70.9	88.0
1930	94.5	68.6	88.3
1940	62.5	60.3	83.2

Both children known to be alive and children with missing death dates are included in ”Not Known to be Dead.” Children ”Not Known to be Dead” were searched for in all censuses. The higher linkage rates for those known to be alive suggest that many children with missing death dates were probably dead.

Table S3: Comparison of Cohort Life Expectanies, Veterans' Children and of Individuals in Other Sources

Age	VCC All	VCC b.1870-9	Pope (1992) b.1870-9	Pope (1992), expanded b.1870-9	SSA b.1900
Male					
20	47.4	47.5	44.3	43.5	47.3
30	39.5	39.6	36.4	36.9	39.3
40	31.4	31.4		29.8	31.2
50	23.4	23.4	22.3	22.6	23.3
60	15.8	15.9		15.8	16.3
70	9.7	9.7		9.4	11
80	4.1	4.1		4.2	6.9
Female					
20	49	48.7	42.2	43.2	53.4
30	41.3	40.9	35.7	37.5	45.8
40	33.6	33.1		30.5	37.6
50	25.5	25.2	22.8	24.4	29.4
60	17.8	17.6		16.9	21.6
70	10.9	10.7		10.3	14.7
80	4.4	4.4		4.2	8.9

VCC=Veterans' Children, SSA=Social Security Administration. Pope (1992) expanded is Clayne Pope's expansion of his 1992 sample.

Table S4: Comparison of Period Life Expectanies, Veterans Fathers and Children's Mothers, and White US 1910

Age	VCC	Haines (1998) 1910
Fathers		
60	15.3	14.1
70	9.1	8.7
80	4.7	4.6
Mothers		
50	23.3	22.8
60	16	15.6
70	9.5	9.5
80	4.8	4.9

VCC=Veterans' Children. All fathers and mothers were alive in 1900. Mothers were at least age 48 and had their first child prior to 1900.

Table S5: Causes of Death by Paternal POW Status, Children Born After 1865 and Surviving to Age 45

	All	Ex-POW, No-Exchange	Ex-POW, Exchange	Non-POW
Missing Cause of Death	0.74	0.72	0.73	0.75
Conditional on Known Cause of Death				
Cardiovascular	0.36	0.38	0.39	0.35
Stroke	0.02	0.02	0.02	0.02
Cerebral Hemorrhage	0.06	0.08	0.07	0.06
Respiratory	0.09	0.07	0.10	0.09
Cancer	0.09	0.10	0.10	0.09
Infectious	0.05	0.05	0.05	0.05
Kidneys	0.06	0.05	0.07	0.06
Accident	0.03	0.03	0.04	0.03
Suicide	0.01	0.01	0.01	0.01

Known causes of death are multiple, not competing.

Table S6: Variable Means by Paternal POW Status, Children Born After 1865 and Surviving to Age 45

	All	Ex-POW, No-Exchange	Ex-POW, Exchange	Non-POW
No fathers	6,367	732	715	4,920
No Daughters	9,412	1,123	1,148	7,141
No Sons	10,491	1,219	1,268	8,004
Years lived	73.96	73.68	74.55	73.91
Daughters	75.59	75.84	76.49	76.41
Sons	72.50	71.68	72.82	72.58
Female	0.47	0.48	0.48	0.47
Birth year	1876.97	1877.20	1877.75	1876.82
Fathers occupation at enlistment				
Farmer	0.66	0.59	0.67	0.67
Laborer	0.16	0.21	0.14	0.15
Artisan	0.13	0.14	0.14	0.13
Professional/Proprietor	0.04	0.05	0.04	0.03
Unknown	0.01	0.01	0.01	0.01
Father Enlisted in one of				
13 largest cities	0.04	0.04	0.05	0.04
Father US-Born 0.86	0.85	0.82	0.86	
Father Irish-Born	0.03	0.05	0.02	0.02
Father's enlistment year	1862.12	1861.75	1861.89	1862.18
Father $<$ \$100 personal property in 1870	0.33	0.35	0.34	0.32
Fathers occupation in 1880				
Farmer	0.54	0.48	0.56	0.55
Laborer	0.23	0.26	0.23	0.22
Artisan	0.12	0.16	0.10	0.12
Professional/proprietor	0.11	0.10	0.11	0.11
Population density in 1880	265.75	312.72	270.31	257.93
No siblings	6.05	6.04	6.13	6.05
Birth order	4.25	4.14	4.20	4.28

The number of siblings and birth order includes siblings who did not survive to age 45 and who are missing death information.

Table S7: Mean Years Lived by Paternal POW Status and Sample, Children Born After 1865 and Surviving to Age 45

	Ex-POW, No-Exchange	Ex-POW, Exchange	Non-POW
Union Army sample			
Daughters	76.16	76.00	75.41
Sons	70.98	72.41	72.58
Andersonville sample			
Daughters	75.58	76.91	
Sons	72.30	73.24	

Table S8: Hazard Ratios of Mortality by POW Status

	Union Army only			Pooled Sample		
	e^{β}	$\hat{\sigma}$	$p > \|z\|$	e^{β}	$\hat{\sigma}$	$p > \|z\|$
Sons						
Father Ex-POW, No-Exchange	1.122	0.058	0.026	1.110	0.045	0.009
Father Ex-POW, Exchange	1.046	0.044	0.277	1.016	0.046	0.663
Difference, No-Exchange and Exchange Ex-POWs $\chi^2(1), \Pr > \chi^2$		1.20	0.273		4.06	0.044
Father Non-POW	1.000			1.000		
Daughters						
Father Ex-POW, No-Exchange	0.935	0.046	0.178	0.997	0.039	0.929
Father Ex-POW, Exchange	0.970	0.043	0.482	0.963	0.034	0.294
Father Non-POW	1.000			1.000		
Test of proportional hazards assumption $\chi^2(14), \Pr > \chi^2$		17.28	0.242		15.82	0.394

The sample consists of children born after the war who survived to age 45. All hazard ratios are relative to a non-POW father and are estimated from a Cox proportional hazards model with covariates as specified by Equation 1 in the paper and with clustering of the standard errors on the family level and stratifying on paternal enlistment year. The specifications control for birth year and paternal enlistment characteristics. The Union Army sample has 17,451 children of 5,641 fathers. The pooled sample has 19,903 children of 6,367 fathers.

Table S9: Robustness Tests for Probability of Survival to Age 80, Under Different Missing Data Assumptions

	Sons			Daughters		
	$\frac{\partial Y}{\partial x}$	$\hat{\sigma}$	$p > \|z\|$	$\frac{\partial Y}{\partial x}$	$\hat{\sigma}$	$p > \|z\|$
Has death date						
Father Ex-POW, No-Exchange	0.052	0.019	0.007	-0.012	0.022	0.588
Father Ex-POW, Exchange	0.005	0.019	0.793	-0.032	0.020	0.118
Test equality ex-POW status, $\chi^2(1) =$		5.08	0.024		0.83	0.363
Assume dead before age 80 if missing death date						
Father Ex-POW, No-Exchange	0.032	0.017	0.055	-0.026	0.018	0.143
Father Ex-POW, Exchange	-0.010	0.016	0.543	-0.037	0.017	0.032
Test equality ex-POW status, $\chi^2(1) =$		5.6	0.018		0.31	0.58
Assume dead at father's age if missing death date						
Father Ex-POW, No-Exchange	0.042	0.019	0.024	0.000	0.020	0.986
Father Ex-POW, Exchange	-0.014	0.018	0.425	-0.034	0.018	0.063
Test equality ex-POW status, $\chi^2(1) =$		8.06	0.005		2.97	0.085
Assume dead after age 80 if missing death date						
Father Ex-POW, No-Exchange	0.064	0.018	0.000	0.015	0.019	0.417
Father Ex-POW, Exchange	0.036	0.019	0.058	-0.005	0.018	0.793
Test equality ex-POW status, $\chi^2(1) =$		1.91	0.167		1.04	0.308

Marginal effects, with standard errors clustered at the family level. Marginal effects are derived from separate probit regressions for sons and daughters, controlling for birth year, the father's occupational class at enlistment, a dummy if the father enlisted in a city of more than 50,000 individuals, a dummy if the father was wounded, an indicator if the father was native-born, a dummy if the father was Irish-born, dummy variables for year of enlistment, and an indicator if the data were from the Union Army sample. 68.9% of sons and 57.2% of daughters died before age 80. Known deaths before age 45 are excluded from the samples.

Table S10: Test of Proportional Hazards Assumption

	ρ	$\chi^2(1)$	p
Father no-exchange ex-POW	-0.00128	0.05	0.8310
Father exchange ex-POW	0.00266	0.16	0.6905
Daughter $\times$			
Father no-exchange ex-POW	0.00265	0.15	0.7009
Father exchange ex-POW	0.00407	0.31	0.5783
Father's Enlistment Occupation			
Laborer	-0.00457	0.46	0.4965
Artisan	-0.01123	2.99	0.0840
Farmer	-0.00550	0.67	0.4136
Unknown	-0.00474	0.54	0.4606
Large city of enlistment	-0.00929	2.86	0.0908
Birth year	-0.01149	2.74	0.0981
Dummy=1 if daughter	0.00213	0.09	0.7660
Father native-born	-0.00273	0.19	0.6656
Father Irish-born	-0.00314	0.27	0.6036
Father wounded in war	0.00941	2.25	0.1339
Dummy=1 if Union Army sample	-0.00490	0.64	0.4240

Test of the proportionality assumption is for the pooled sample in Table S8.

Table S11: Impact of POW Status on Sons' Socioeconomic Status and Family Structure

			POW, No Exchange			POW, Exchange		
Outcome	Mean	Model	$\frac{\partial Y}{\partial x}$	$\hat{\sigma}$	p	$\frac{\partial Y}{\partial x}$	$\hat{\sigma}$	p
1910 Occupation is		Multinomial Logit						
Laborer	0.32		0.025	0.023	0.279	0.016	0.022	0.543
Artisan	0.17		0.000	0.017	0.999	0.004	0.017	0.810
Farmer	0.29		-0.035	0.025	0.153	0.001	0.021	0.967
Professional/Proprietor	0.23		0.010	0.020	0.608	-0.020	0.019	0.282
1920 Occupation is		Multinomial Logit						
Laborer	0.28		0.008	0.021	0.691	-0.001	0.020	0.945
Artisan	0.19		0.008	0.017	0.625	-0.009	0.017	0.613
Farmer	0.29		-0.048	0.024	0.047	0.006	0.021	0.781
Professional/Proprietor	0.25		0.031	0.019	0.110	0.004	0.019	0.824
1910 Occupational Score, Non-Farmer	26.02	OLS	0.038	0.026	0.140	0.019	0.029	0.524
1920 Occupational Score, Non-Farmer	28.47	OLS	0.015	0.019	0.448	0.030	0.019	0.112
1910 Homeowner, if household head	0.54	Probit	-0.012	0.028	0.671	-0.019	0.026	0.460
1920 Homeowner, if household head	0.45	Probit	0.042	0.024	0.080	0.015	0.024	0.524
In school in 1880, if age 5-14	0.69	Probit	0.029	0.032	0.373	0.035	0.027	0.203
Years education, 1940	8.29	OLS	0.328	0.182	0.072	0.097	0.160	0.543
In same county as father, 1900, Age 21+	0.62	Probit	0.011	0.026	0.686	-0.018	0.026	0.481
1910 Household Head, Age 21+	0.73	Probit	-0.002	0.018	0.918	-0.042	0.017	0.016
Married in 1910, age 21+	0.75	Probit	-0.006	0.018	0.741	-0.026	0.018	0.138
Ever married	0.90	Probit	-0.001	0.012	0.960	-0.014	0.012	0.251
Ever divorced (if ever married)	0.04	Probit	-0.025	0.009	0.005	-0.010	0.007	0.177

Marginal effects, with standard errors clustered at the family level. Marginal effects are derived from estimating regressions which control for birth year, the father's occupational class at enlistment, a dummy if the father enlisted in a city of more than 50,000 individuals, a dummy if the father was wounded, an indicator if the father was native-born, a dummy if the father was Irish-born, dummy variables for year of enlistment, and an indicator if the data were from the Union Army sample.

Table S12: Quality of Paternal Marriages by Ex-POW Status

Dependent Variable:	Logarithm of Wealth of Veteran's Father-in-Law's			
	Real Estate	Personal Property	Real Estate	Personal Property
Marriage Type:	All		Post-War	
Ex-POW, No Exchange	0.161	0.088	0.223	0.103
	(0.409)	(0.089)	(0.436)	(0.100)
	[0.694]	[0.324]	[0.609]	[0.303]
Ex-POW, Exchange	0.007	0.105	0.000	0.060
	(0.390)	(0.085)	(0.423)	(0.096)
	[0.986]	[0.215]	[1.000]	[0.531]
Wounded	-0.203	-0.118	-0.223	-0.148
	(0.243)	(0.054)	(0.268)	(0.062)
	[0.404]	[0.027]	[0.406]	[0.017]
Pseudo R^2	0.004	0.015	0.007	0.020
Observations	4,124	2,715	2,921	2,198

Post-war marriages are all known post-war first marriages. The sample consists of mothers of all children who survived to age 45. The sample is restricted to those mothers linked to their 1850 or 1860 households. Father-in-law's real estate is real estate wealth either in 1850 or in 1860 when the 1850 value is unavailable. Father-in-law's personal property wealth is in 1860. Median regressions. Standard errors are in parentheses. P-values are in square brackets. Additional controls are occupational class at enlistment, enlistment in a city of 50,000 or more, and dummy variables for year of enlistment, Irish birth, and US birth.

Table S13: Hazard Ratios of Death For Fathers and Mothers By Own or Husbands' Ex-POW Status

	Veteran Fathers			Mothers		
	e^{β}	$\hat{\sigma}$	p	e^{β}	$\hat{\sigma}$	p
No Exchange Ex-POW	1.142	0.052	0.004	0.970	0.047	0.526
Exchange Ex-POW	0.946	0.041	0.197	0.930	0.041	0.105
Non-POW	1.000			1.000		
Difference, No-Exchange and Exchange Ex-POW $\chi^2(1), \Pr > \chi^2$		14.73	0.000		0.67	0.412
Global test of proportional hazards assumption $\chi^2(16), \Pr > \chi^2$		17.58	0.349		20.60	0.195

Hazard ratios relative to non-POWs are estimated from Cox proportional hazards. For fathers, we examine years lived since 1900 and for mothers we examine years lived since the birth of her first child, regardless of whether the child survived to age 45. These are the dates are when fathers and mothers enter the sample. All models control for enlistment characteristics and for either age in 1900 (for fathers) or age at birth of first child (for mothers). For mothers, we stratify on first births below age 20, births age 20-34, and births age 30 or later. We trim the sample of mothers to exclude observations with age at first births given as below age 14 or above age 50. 6,360 veteran fathers and 6,238 mothers.

Table S14: Hazard Ratios of Mortality by Paternal Ex-POW Status, Children Born After the War, Controlling for Parental Life-Spans

	(1)			(2)			(3)		
	e^{β}	$\hat{\sigma}$	p	e^{β}	$\hat{\sigma}$	p	e^{β}	$\hat{\sigma}$	p
Sons									
Father Ex-POW, No-Exchange	1.110	0.045	0.009	1.109	0.045	0.010	1.092	0.043	0.024
Father Ex-POW, Exchange	1.016	0.036	0.650	1.021	0.036	0.559	1.028	0.036	0.439
Father Non-POW	1.00			1.000			1.000		
Difference, No-Exchange and Exchange Ex-POWs $\chi^2(1), \Pr > \chi^2$		4.01	0.045		3.55	0.060		1.97	0.161
Daughters	1.000								
Father Ex-POW, No-Exchange	0.998	0.039	0.965	1.000	0.039	0.995	0.986	0.038	0.720
Father Ex-POW, Exchange	0.966	0.035	0.334	0.966	0.035	0.343	0.969	0.035	0.389
Father Non-POW	1.000			1.000			1.000		
Global test of proportional hazards assumption $\chi^2(n), \Pr > \chi^2$	$\chi^2(15)$	16.15	0.372	$\chi^2(17)$	21.02	0.226	$\chi^2(18)$	24.30	0.145

The sample consists of children born after the war who survived to age 45, with information on lifespans of both parents. All hazard ratios are relative to a non-POW father and are estimated from a Cox proportional hazards model with covariates as specified by Equation 1 in the text and with clustering of the standard errors on the family level and stratifying on paternal enlistment. Specification (2) adds maternal life span and also stratifies on whether the mother lived to age 80. Specification (3) adds paternal life span and additionally stratifies on whether the father lived to age 80. 19,879 children and 6,360 fathers.

Table S15: Magnitude of Selected Hazard Ratios

Impact on Years Lived of	Variable	e^{β}	$\hat{\sigma}$	$p > \|z\|$
Son	Father No-Exchange Ex-POW (Table 1, Specification 1)	1.110	0.045	0.009
Veteran	No-Exchange Ex-POW (Table 3)	1.142	0.052	0.004
Veteran	Enlisted in large city (Table 3)	1.188	0.077	0.008
Child	Father enlisted in large city (Table 1, Specification 1)	1.109	0.053	0.030
Son	Father in 1880 laborer relative to farmer (controlling for own occupation, Table 1, Specification 3)	1.079	0.034	0.015
Child	Life span of father (Table S14, Specification 3)	0.993	0.002	0.000

Table S16: Hazard Ratios of Death by Cause by Paternal Ex-POW Status, Children Born After the War

	Cancer			Hemorrhage			Accident/ Suicide		
	e^{β}	$\hat{\sigma}$	p	e^{β}	$\hat{\sigma}$	p	e^{β}	$\hat{\sigma}$	p
Sons									
Father Ex-POW, No-Exchange	1.446	0.295	0.071	1.810	0.430	0.012	0.825	0.277	0.567
Father Ex-POW, Exchange	1.100	0.239	0.660	1.196	0.281	0.446	0.886	0.267	0.690
Father Non-POW	1.000			1.000			1.000		
Difference, No-Exchange and Exchange Ex-POW $\chi^2(1), \Pr > \chi^2$		1.26	0.262		2.56	0.110		0.04	0.844
Daughters									
Father Ex-POW, No-Exchange	0.714	0.168	0.151	0.887	0.300	0.723	1.757	0.674	0.141
Father Ex-POW, Exchange	1.019	0.229	0.933	1.013	0.327	0.969	1.545	0.620	0.279
Father Non-POW	1.000			1.000			1.000		
Global test of proportional hazards assumption $\chi^2(n), \Pr > \chi^2$	$\chi^2(13)$	18.55	0.138	$\chi^2(14)$	12.37	0.577	$\chi^2(13)$	17.88	0.162

Hazard ratios are from a Cox proportional hazards model of time until death from a specific cause with the covariate specified in Equation 1, clustered on the family level and stratifying on paternal enlistment year. Control variables are birth year and paternal enlistment characteristics. 5,083 children and 2,606 fathers.

Table S17: Impact of Month of Birth on Mortality, Sons and Daughters of Non-POWs

	Sons			Daughters		
Month Birth	Haz. Ratio	Std. Err.	P-Value	Haz. Ratio	Std. Err.	P-Value
January	0.951	0.048	0.328	0.964	0.052	0.499
February	0.968	0.050	0.524	0.989	0.054	0.838
March	1.000			1.000		
April	0.953	0.050	0.365	1.002	0.055	0.968
May	0.985	0.053	0.785	0.920	0.052	0.139
June	0.939	0.052	0.256	0.966	0.056	0.558
July	0.950	0.050	0.326	0.979	0.058	0.712
August	0.895	0.044	0.025	0.933	0.051	0.202
September	0.995	0.049	0.921	0.895	0.048	0.041
October	0.919	0.048	0.104	0.877	0.049	0.018
November	0.888	0.046	0.023	0.934	0.051	0.214
December	0.872	0.045	0.007	0.947	0.052	0.320
Observations	7,875			7,074		

Standard errors are clustered on the family. Additional controls are paternal occupational class at enlistment, enlistment in a city of 50,000 or more, Irish birth, and US birth, birthyear, and a dummy if in the original Union Army sample. The regressions are stratified on year of enlistment.

Table S18: Impact of Quarter of Birth on Sons' Mortality, Among Families with than One Son

	Non-POWs			All		
Month Birth	Haz. Ratio	Std. Err.	P-Value	Haz. Ratio	Std. Err.	P-Value
First	1.026	0.055	0.628	0.998	0.047	0.970
Second	1.000			1.000		
Third	0.942	0.053	0.286	0.971	0.048	0.544
Fourth	0.893	0.051	0.047	0.901	0.045	0.036
Observations	6,127			8,071		

Stratified on the family. Standard errors are clustered on the family. The additional control variable is year of birth.

Table S19: Population Density in Birth County and Quarter of Birth Effects, Sons of Non-POWs

	e^{β}	$\hat{\sigma}$	$p > \|z\|$
First quarter	1.035	0.109	0.743
Third quarter	0.965	0.102	0.735
Fourth quarter	0.772	0.079	0.011
Logarithm birth county population density	1.103	0.032	0.001
$\times$ first quarter	0.954	0.029	0.130
$\times$ third quarter	0.965	0.030	0.246
$\times$ fourth quarter	1.012	0.029	0.682

Additional control variables are those used for Equation 1. Standard errors are clustered at the family level. Stratification on father's enlistment year. Because the hazard is not constant over time for different population densities, population density is interacted with time.