Children and Grandchildren of Union Army Veterans: New Data Collections to Study the Persistence of Longevity and Socioeconomic Status Across Generations

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Abstract

This paper introduces four new intergenerational and multigenerational datasets which follow both sons and daughters and which can be used to study the persistence of longevity, socioeconomic status, family structure, and geographic mobility across generations. The data follow the children of Black and White Union Army veterans from birth to death, linking them to the available censuses. The White samples include an over-sample of children of ex-POWs. A separate collection links grandchildren of White Union Army veterans to their death records. The data were created with high quality manual linkage procedures utilizing a wide variety of records to establish links.

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What explains the intergenerational persistence of poor health and poverty? Researchers have pointed to inadequate investments in children, including in their health in utero and early life (Barker, 1992, 1994; Forsdahl, 1977), in their non-cognitive skills (Heckman, 2007), and in their access to an education which imparts skills not easily replaced by computers or workers abroad (Goldin and Katz, 2008). Scholars have debated the role of public health, the rise of the welfare state and increases in productivity in improving health (Floud et al., 2011; Deaton, 2013; Aizer et al., 2016; Bhalotra et al., 2017). They have parsed intergenerational mobility data for countries, e.g. (Blanden, 2013), and localities within countries (Chetty et al., 2014), and examined the role of public goods and of the welfare state in ensuring opportunity (Heckman and Landersø, 2022).

Studying the U.S. past has required the creation of new datasets from historical census schedules to investigate intergenerational mobility and from vital records to examine mortality, fertility, and nuptiality across multiple generations (Bailey et al., 2022; Long and Ferrie, 2013; Berger et al., 2021; Tan, forthcoming). A difficulty in creating datasets for the U.S. past is that common procedures to link across historical records lead to linkage rates on the order of 25%, raising selection concerns, and to false positives (Bailey et al., 2020), potentially introducing biases affecting comparisons across social or ethnic groups (Anbinder et al., 2021) or across time.

This paper introduces new intergenerational and multigenerational data collections which follow both sons and daughters in almost equal proportions. The data follow the children of Black and White Union Army veterans from birth to death, linking them to the available censuses. A separate collection links grandchildren of White Union Army veterans to their death records. Linkage rates are comparable to those from high quality modern day longitudinal surveys because the data are based on high quality manual linkage procedures which utilize a wide variety of records to establish links.

The three generations covered in the datasets experienced the change from a largely

agricultural to an industrial more urbanized economy based on brains rather than brawn, the westward expansion, the rise in women's labor force participation, the increase in women's life expectancy over men's, and the health transition, that is, the shift from a high mortality regime in which infectious disease predominated to a low mortality regime dominated by chronic disease deaths. Union Army veterans were the first cohort to reach age 65 in the twentieth century. Their children reached age 65 around 1940 and their grandchildren reached the same age in the early 1970s. The data thus provide multigenerational coverage prior to the start of the Panel Study of Income Dynamics (PSID) in 1968 and the last generation covers some of the same cohorts as the Retirement History Longitudinal Survey series which began in 1969.

The data collections were designed to study how paternal wartime shocks (and particularly the POW experience), arguably exogenous events, reverberate across the generations to affect their longevity. However, the data also can be used to examine social status, migration, marriage patterns, and fertility as outcomes, as well as investigate inter- and multigenerational processes more broadly.

A unique feature of the data collection is that linkage rates for daughters are as good as those for sons. Few historical databases for the US permit the study of daughters' outcomes. While recent data suggests that intergenerational transmission of socioeconomic status to sons and daughters is similar (Chadwick and Solon, 2002), there is no guarantee this was true in the past and there may have been variation across time periods and by father's initial status (Craig et al., 2019; Glenn et al., 1974). Women also have become longer-lived than men, are prone to different chronic conditions, and their health outcomes in response to both own and ancestral environments differ from those of men (Lumey and van Poppel, 2013; Gavrilova et al., 2003; Pembrey et al., 2014; Bygren et al., 2014, 2001; Kaati et al., 2007; Vågerö et al., 2018; Goldin and Lleras-Muney, 2019).

A second unique feature of the data is linkage rates on the order of 85% for descendants

of White Union Army veterans and on the order of 68% for descendants of Black veterans. These high linkage rates can provide a baseline for assessing potential biases in studies using automated linking techniques.

A third feature of the samples is that entire families are followed, permitting comparisons within veteran families across family lines. Allowing for a veteran-specific error term can capture unobserved family characteristics while permitting the study of the rich set of observable characteristics available in the sample.

1 Data Set Creation

Figures 1 and 2 provide schematics showing sample construction of the datasets. The veterans were drawn from three different data collections 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. The sample was restricted 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. The third sample consists of 21,186 US Colored Troops (USCT), including their White officers, collected by the program project, Early Indicators of Later

Work Levels, Disease, and Death (NIA P01 AG10120, PI: Fogel). This sample is described in Costa et al. (2017). All samples, with on-line codebooks, are available at NBER's data web page.[1]

Subsamples of veterans' children were 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 were linked to any census or death record information not previously collected and the children's mothers were linked to their childhood censuses. Among White veterans, the subsample over-samples children of ex-POWs, tracing the children of all 1,198 ex-POWs who survived to 1900 in the original Union Army and the Andersonville sample. The White, non-POW sample originates from a subsample of 9,343 non-POWs drawn from the original Union Army sample matched on ex-POW demographic and socioeconomic characteristics at enlistment. The Black sample was drawn from 4,898 African-Americans who lived to 1900.

The Veterans' Children's Census (VCC) samples contain 54,568 White children and 21,084 Black children. Information also is included on veterans, including childless veterans. Veterans and children were linked to death records and all available manuscript census schedules. Veterans can be linked to the rich array of wartime and postwar variables available in the pension records through a project generated unique identifier. VCC place names are coded with ICPSR county codes and occupations are coded with 1950 occupational codes. Causes of death are coded with ICD 10 codes. Original place names, occupations, and causes of death are provided. These data are available at NBER's data web page.[2]

[1] See https://www.nber.org/programs-projects/projects-and-centers/union-army-data, where the samples are referred to as as Union Army, Andersonville, and Original and Expanded U.S. Colored Troops (USCT), respectively.

[2] https://www.nber.org/programs-projects/projects-and-centers/union-army-data., Veteran's Children Cen-

The White VCC samples were used to create a sample of White veterans' grandchildren with an even larger oversample of descendants of ex-POWs (NIA R21 AG064460, PI: Costa). Birth and and death information were obtained for all grandchildren of all ex-POWs and a subsample of grandchildren of non-POWs. Because the grandchildrens' parents were linked to the census, the data contain detailed information on the geography, socioeconomic status, and family structure of the grandchildren when they were young. The search for birth and death dates was restricted to grandchildren of veterans with at least one child who survived to age 45 to obtain a larger sample of grandchildren at lower cost, but all grandchildren were followed regardless of their parent's age at death. The veterans' grandchildren sample contains 1,444 ex-POWs, their 8,190 children, and their 17,015 grandchildren and 1,381 non-POWs, their 8,596 children, and 18,658 children. The data soon will be made available at NBER's data web page.

Birth and death information for children and grandchildren come from family circulars in Union Army pension records (which sometimes contain daughters' married names), manuscript census records, Find a Grave, the Social Security-death index and applications, WWI and WWII draft cards, state vital records (which include birth, marriage, and death indexes), Veterans' Administration records, obituaries, and public records indexes. Birth and death dates are known for over 80% of White sons and 75% of White daughters and 42% of Black sons and 33% of Black daughters (see Table 1). A cause of death (including unknown) is available for less than 40% of children, with availability depending on state of death. Among White grandchildren, virtually all have a birth date (though children who did not survive to be in a census might never be recorded) and 95% of grandsons and 90% of granddaughters have a death date. Causes of death were not collected for grandchildren because too few were available.[3]

sus (VCC). The data are provided as three separate samples: POW VCC, Non-POW Whites VCC, and USCT VCC. The data also have been submitted to ICPSR and are in the data check queue.

[3]Causes of death are available for 23% of grandsons with a death year and for 17% of granddaughters

Linkage rates to the census are high (see Table 1). Among children known to be alive at the time of the census, linkage rates to the 1880 census, when most children were in their parents' household, are roughly 93% for White children and 88% for Black children. Linkage rates to the 1940 census, which has a poor index relative to other censuses, are 79% for White children and 54% for Black children. Grandchildren are linked to censuses because they are in their parents' households. Although linkage rates generally are somewhat higher for boys than for girls, differences in linkage rates tend to be on the order of less than 1 percent. In contrast, linkage rates in the literature using automated linkage algorithms yield linkage rates of 20-50% for White men, depending on the algorithm and sample (Bailey et al., 2020), and on the order of 6% for Black men. Using Massaschusetts marriage certificates, intergenerational linkage rates are on the order of 10 to 13% for father-son and father-daughter pairs (Craig et al., 2019). While some of the differences in linkage rates arise from conditioning on children known to be alive at the time of the census, Table 1 shows that linkage rates for censuses in which most children would be past their fatal years (1880) or would be prime-age adults (1920) are high even when those with no date of death are included in the analysis.

Why are linkage rates in the VCC samples so high relative to datasets constructed using automated linkage algorithms on census information? First, the pension records often provide veterans' children's names, dates, places of birth and veterans' addresses. Second, the sample is a Northern sample (the North had better records) and the children and grandchildren are all native-born. Third, the sample was created by staff with extensive training in genealogical research and, as previously noted, using a wide variety of records.

Linkage methods were designed to reduce the rate of false positives. All links underwent an extensive series of cross-checks across different sources.[4] Inputters determined

with a death year.

[4] Ancestry, Family Search and Find A Grave were used to find an assortment of records, with each record

on a case-by-case basis which information was strongest to search for, then reviewed the actual record and determined the strength of the match by seeing all the information together. Inputters recognized indexing errors, deciphered poor handwriting, sorted through mistakes on the record and made informed decisions. Extant matching algorithms do not use a variety of records and, unlike humans, cannot connect the dots and follow the clues when one record leads to the next;, cannot go beyond the digitized data to open the document to see the image, recognize errors in indexing and recording, alter the search sequence and change the importance of search fields on a case-by-case basis; and cannot eliminate results that make no sense. While a critique of utilizing all information on an individual, particularly family members, is the potential introduction of bias, Helgertz et al. (2022) shows that using all mutable and immutable information on an individual leads to higher linkage rates and lower false positive rates while introducing minimal bias.

2 Sample Characteristics

The VCC samples represent sons and daughters in roughly equal proportions. The White VCC samples consist of approximately 49% veterans' sons, 48% veterans' daughters, with the remainder of unknown sex. Sons comprise roughly 47% of the Black VCC sample and daughters 48%, with the remainder of unknown sex. The sample means presented in Table 2 show that White veterans' children were born primarily in the middle Atlantic and the Midwest. Black veterans' children were born in those states as well, but also in Border states and the South. Unlike the general African-American population, Black veterans'

often leading to another record. These records include include death records (often with parents' names, exact birth dates, exact death dates and other family member names), birth records (with exact birth dates and parents' names), marriage records (with spouse's name and often with parents' names), WWI and WWII draft registration cards (with exact birth dates, next of kin, often a parent or a spouse, and address), and Social Security claim or death index (with exact birth dates and frequently with parents' names). The unindexed notes on Social Security applications list additional names (including maiden names).

children were not born primarily in the South because recruitments in the South depended on liberation by the Union Army.

A large fraction of Whites were the children of farmers and the shift out of farming is visible in the occupations of sons and sons-in-law (see Table 2). The veterans in the White VCC were more likely to be farmers than their counterparts in the general population. Table 3 shows occupations in 1880 among native-born men age 32 to 50 in the general population, in the general population reweighted to have the same birth state distribution as veterans, and in the veteran population, where the veteran population also includes veterans without children. Forty-eight percent of veterans were farmers compared to 39% of the general population with the same state of birth distribution. The percentages who were artisans or laborers were similar, suggesting that while the veteran population was more rural, there were not large differences in social status. The fraction of veterans owning land and property in 1870 was similar to the general population reweighted to have the same birth state distribution but conditional on owning land or property, the value of veterans' holdings was lower (see Table 3).

African-American veterans, who were more urban than the general African-American population, were less likely to be farmers and were more likely to be laborers than the general population, even when the general population was reweighted to have the same state of birth distribution (see Table 3).

Life expectancies estimated for children suggest that early deaths were understated (see Table 4) and thus that the data are better suited for studying mortality at older ages. For the cohort born 1870-79, life expectancies were high relative to a genealogical database at ages 0 and 10 and lack the expected pattern in a high mortality regime of lower life expectancies at age 0 relative to age 10. By age 40 the life expectancies of both men and women begin to resemble more closely those observed in the genealogical database and in Social Security Administration life tables. Life expectancies for the children of USCT

veterans are lower than those of the children of White veterans until age 80 but then catch up, consistent with patterns noted by Elo (2001) in comparing White and Black lifetables.

The sample of grandchildren is 51% male and 49% female. Linkage rates to death records are higher than for children (see Table 5, which also provides mean birth and death years). Mortality patterns at age 10 or older among veterans' grandchildren were similar to those observed for Social security area cohorts even though life expectancy of grandchildren of either sex at age 10 or greater was higher by about a year (Table 6), probably because grandchildren were native-born and were concentrated in the more rural Midwest. As expected, deaths below age 10 are under-reported in the sample.

The use of administrative records to create the VCC samples may explain some of the differences in life-expectancies by age compared to other sources. The pension records are an important source of information for children's births and deaths at a time of sparse vital record keeping.[5] Because the family circulars soliciting information about family members were sent out in 1898 and 1915, this administrative feature will bias against finding veterans' children who died young.[6] This administrative feature also partially may account for the substantial difference between the fraction of White and Black veterans without children (10 versus 23%). Black veterans entered the pension rolls at later ages than Whites, thus missing one circular and because they faced higher death rates may have died before filling out the 1915 circular, the only one to ask about both living and dead children. In addition, because child deaths also were higher among African-Americans in the northern US, fewer children may have been recorded.

The most important administrative records in creating the sample of grandchildren are

[5]Death sources are available in some form on-line for all 50 states. Each state varies in the type of death information and dates available. Sometimes information is provided only by the individual counties. A listing of availability is provided by deathindexes.com.

[6]The 1898 circular asked for names and birth dates of living children and the 1915 circular asked for this of all children, living or dead.

birth and death records. Relative to the veterans' children cohorts, these become increasingly available for the veterans' grandchildren and may explain why life expectancies between ages 10 and 40 in the grandchildren's sample more closely resemble those in other sources compared to the children's sample.

3 Research Possibilities

3.1 Longevity

The samples have been used primarily to study longevity. Most studies have taken advantage of the linkage of both men and women to study the sex-specificity of transmission of the veteran's ex-POW status to his children and grandchildren. A grandfather's harsh captivity experience during his growing years was associated with shorter longevity among his sons and male-line grandsons but not among his daughters, female-line grandsons, granddaughters, children-in-law, or wives of male-line grandsons. Transmission was mediated by the intrauterine environment of the male-line grandson and of his father, as proxied by season of birth, suggesting a dynamic interplay between ancestral and early life environments across generations to affect health (Costa et al., 2018b; Costa, 2021). The findings could not be explained by socioeconomic or cultural transmission or by marriage selection, but are consistent with an epigenetic explanation, that is, with an heritable change in gene function caused by the environment. In contrast, among children of non-POWs, the largest association between war wounds and mortality was for daughters whose fathers had been wounded after age 30, when occupational adjustments were harder (Costa et al., 2020).

The samples can be combined with additional information to study intergenerational effects. For example, Liu (2021) used the VCC samples and exploited changes in child

schooling requirements over time and across states to find that exogenous increases in children's education increase the longevity of veterans and their wives, probably because better educated children could provide more financial support.

3.2 Fertility and Nuptiality

The data suggest that paternal health shocks affected fertility through marriage. Among White veterans, 25% of ex-POWs had no children compared to 10% of non-POWs. However, conditional on having children, ex-POWs had 6.1 children per veteran compared to the 5.4 had by non-POWs (calculated from the numbers in Figure 1). Among White non-POWs who had been wounded in the war and who were unmarried prior to the war, both the probability of having any children and the number of children conditional on having children fell. Almost all of those without children were unmarried (Costa et al., 2020).

Health shocks which left veterans physically scarred affected the quality of their marriage match. Wounded veterans who married after the war were more likely to marry women with less family wealth in 1860 than veterans who had not been wounded (Costa et al., 2020). In contrast, the matches made by ex-POWs, including those who experienced a harsh captivity, were no different from those made by non-POWs (see the Supplemental Information to Costa et al. (2018b)).

3.3 Social Mobility

Neither the father's nor the grandfather's POW experience affected the socioeconomic status of children or grandchildren. Although veterans were less likely to be in farming after the war if they had had a severe POW experience, the association with children's occupational class was negligible. There was no association between the veteran's ex-POW status and his children's probability of owning property (see the Appendices to Costa et al.

(2018b) and Costa (2021)). The absence of an association between a variable which predicts longevity and socioeconomic status most likely is explained by socioeconomic status being established before health declined.

The association between a father's war wounds and his children's socioeconomic outcomes was both age- and sex-specific (Costa et al., 2020). Among veterans who were younger than age 30 before the end of the war, daughters of the wounded were more likely to be married to laborers and less likely to be married to farmers than daughters of those who had not been wounded. Sons were unaffected. Because wounded veterans moved out of farming, the results suggest that the father's social circle might have had a disproportionate impact on daughters. Among veterans who were 30 or older at the end of war, a group which suffered wealth declines if wounded, sons of the wounded were the most affected and were less likely to be farmers and more likely to be laborers probably because they could not count on family assistance towards land ownership.

The data provide the opportunity of comparing the intergenerational transmission of socioeconomic status by sex and by race. A preliminary examination of the data comparing the occupational class of non-POWs in 1880 with that of their sons and sons-in-law in 1920 suggests that differences in social mobility patterns by sex among White non-POWs were relatively modest (see Tables A.1 and A.2). Upward mobility from the laboring class was similar for sons and daughters, with 75% of the sons of laborers rising to become farmers, professionals, artisans, or clerical workers and 77% of the daughters marrying a husband who achieved one of those occupational groups. Thirteen percent of sons of fathers who were farmers, professionals, artisans or clerical workers fell down the occupational ladder to become laborers or farm laborers. The comparable figure for daughters, using their husbands' occupation, was 10%.

The children of Black veterans were both less likely to rise up the occupational ladder and were more likely to fall to the laboring class compared to the children of White

veterans (see Tables A.3 and A.4). Among Black veterans, 53% of sons and 55% of daughters whose fathers were laborers became or married husbands who became farmers, professionals, artisans, or clerical workers. Among the Black veterans who were farmers, professionals, artisans or clerical workers, 32% of sons fell down the occupational ranking to become laborers or farm laborers, as did 27% of their daughters to become wives of laborers or farm laborers.

3.4 Migration

The datasets provide the opportunity to study the intergenerational determinants of migration and the relationships between migration, social mobility and longevity. Figures 3 and 4, which respectively map counties of residence circa age 40 for veterans and their children and birth and death counties for grandchildren, illustrate the move west among White children and grandchildren and the move to Florida among grandchildren. Migration among Black children was more limited.

Previous work has studied migration among both White and Black veterans, linking the migration decision to the social networks arising from wartime service (Costa and Kahn, 2006; Costa et al., 2018a; Zhang, 2021). Because the samples of descendants do not follow everyone in a company (though contingent on veteran and child survivorship the Black sample comes close), the samples are not suited to studying whether social networks persisted to later generations. However, the data could be used to examine the persistence of location among children and grandchildren as a function of the veteran's wartime experiences.

4 Topics for Future Research

Future research should take advantage of two unique features of the data: 1) the rich information on the wartime and postwar experiences of veterans and 2) linkage to all available censuses for both sexes. Wartime experiences whose effects on children have not yet been studied include veterans' disease and combat experience, where they were stationed, their ability to rise through the ranks to become officers or to hold higher level duties, and the characteristics of their wartime comrades. Whether grandchildren had better socioeconomic outcomes if their grandfathers received pensions has not been investigated.

Linkage to all available censuses provides snapshots on place, socioeconomic status, and family structure at ten year intervals. Because counties are coded with ICPSR codes, linkage to county characteristics is straightforward and will enable researchers to examine how paternal wartime experiences interact with local conditions to determine childrens' health and socioeconomic outcomes. One of the findings from the VCC data collection is that the relationship between veterans' ex-POW status and children's and grandchildren's longevity and overweight is mediated by children's and grandchildren's in-utero conditions, as proxied by season of birth (Costa et al., 2018b; Costa, 2021, 2022).

The VCC and grandchildren's samples permit expansion possibilities to study additional child and grandchild outcomes and heterogeneity in responses to the original veteran shock by increasing both breadth and depth of coverage. Unfortunately, increasing the number of African-Americans would be challenging because mortality among African-Americans was high and a large fraction of veterans died prior to filling out the first family circular. However, there are two main options for increasing breadth of coverage. One option would be to increase the number of children or grandchildren of non-POWs from the Union Army sample to study wartime shocks other than the POW experience.

A second option to increase breadth of coverage would be to examine how urban en-

vironments, which were deadly in the 19th century but increasingly became areas of economic opportunity, affected child and grandchild health and socioeconomic outcomes by utilizing the sample of urban Union Army veterans. This dataset is an oversample of White soldiers who enlisted in the largest cities in the US (for a description of the sample see Costa et al. (2017)). Despite the difficulty in finding individuals in urban areas, linkage rates to the census, while lower than for the Union Army sample still are high. Among veterans who survived to 1900, 79% of veterans from the urban sample were linked to the 1880 census compared to 95% of White veterans in VCC. An advantage of following the descendants of urban Union Army veterans is that it would yield 449 ex-POWS and non-POWs could be chosen to match ex-POW characteristics. A disadvantage of following descendants of urban veterans is that preliminary estimates, based on a small pilot of 50 veterans, suggest that only 56% of sons would be linked to death dates.[7] However, 92% of grandsons would be linked to death dates. The creation of a sample of urban descendants would require a large number of veterans both because urban dwellers reduced fertility earlier and more sharply than rural dwellers and because urban dwellers are harder to find in records. While there 2.1 sons per veteran, there were only 1.6 grandsons per veteran in the urban pilot.

The biggest opportunities for examining additional outcomes and increasing depth of coverage lie in the grandchildren's sample. One expansion possibility is to examine grandsons' health at younger ages by obtaining height and weight for men born between 1877 and 1929 (inclusive) because they registered for the draft under several selective service acts which ended in 1947. (Men born between 1877-1897 were part of the "Old Man's Draft" implemented to inventory manpower.) Linkage of male-line and female-line grandson cousins (but not sons-in-law) to these records has been completed. Conditional on being alive in 1940, 99% of grandsons are linked to their draft cards. This linkage reveals

[7] This fraction is likely to rise with the growing on-line availability of death indexes.

that male-line but not female-line grandsons were more likely to be overweight if descended from a grandfather who during his growing years faced a severe captivity (Costa, 2022).

Another expansion possibility to examine additional child outcomes or investigate heterogenous veteran effects on child outcomes is census linkage of the children to the 1950 census to observe them in their old age and complete census linkage of the grandchildren, that is, linkage to the 1930-1950 censuses, when grandchildren would have been in their prime working ages. Grandchildren have been linked to selected variables in the 1940 census. Including all grandchildren regardless of residence in parents' households, yielded linkage rates for sons and daughters, respectively, of 83 and 77% if known to be alive in 1940 and 72 and 64% if those with unknown death dates also are included. Linkage to selected 1940 census variables has revealed suggestive evidence that education mediates the relationship between the veteran's ex-POW status and the longevity of his male-line grandsons (Costa, 2021).

5 Conclusion

The findings thus far from the Veterans' Children' Census samples illustrate the importance of being able to follow both sons and their daughters and their own sons and daughters in turn through their life cycles. The ability to follow both sons and daughters is particularly important in examining the transmission of health shocks where sex-specific biological processes such as epigenetic inheritance may be at work or where exposure to infectious disease may have depended on sex. Following children of both sexes also is important in examining the transmission of socioeconomic shocks if there are differential responses by sex, for example, if later social status depends on the family social circle or on access to family wealth in a sex-specific way.

The challenge for researchers is the creation of historical datasets following both sons and daughters. Creating the VCC samples was time-intensive and required skilled labor. The resulting samples yielded linkage rates comparable to those from the federally funded long-running panel datasets used in social science research thus assuaging concerns about selection bias in who is not linked. As more archival collections become accessible in machine-readable form, it is important to understand how algorithms can be improved. The data collections provide a gold standard for following both sons and daughters in the US past.

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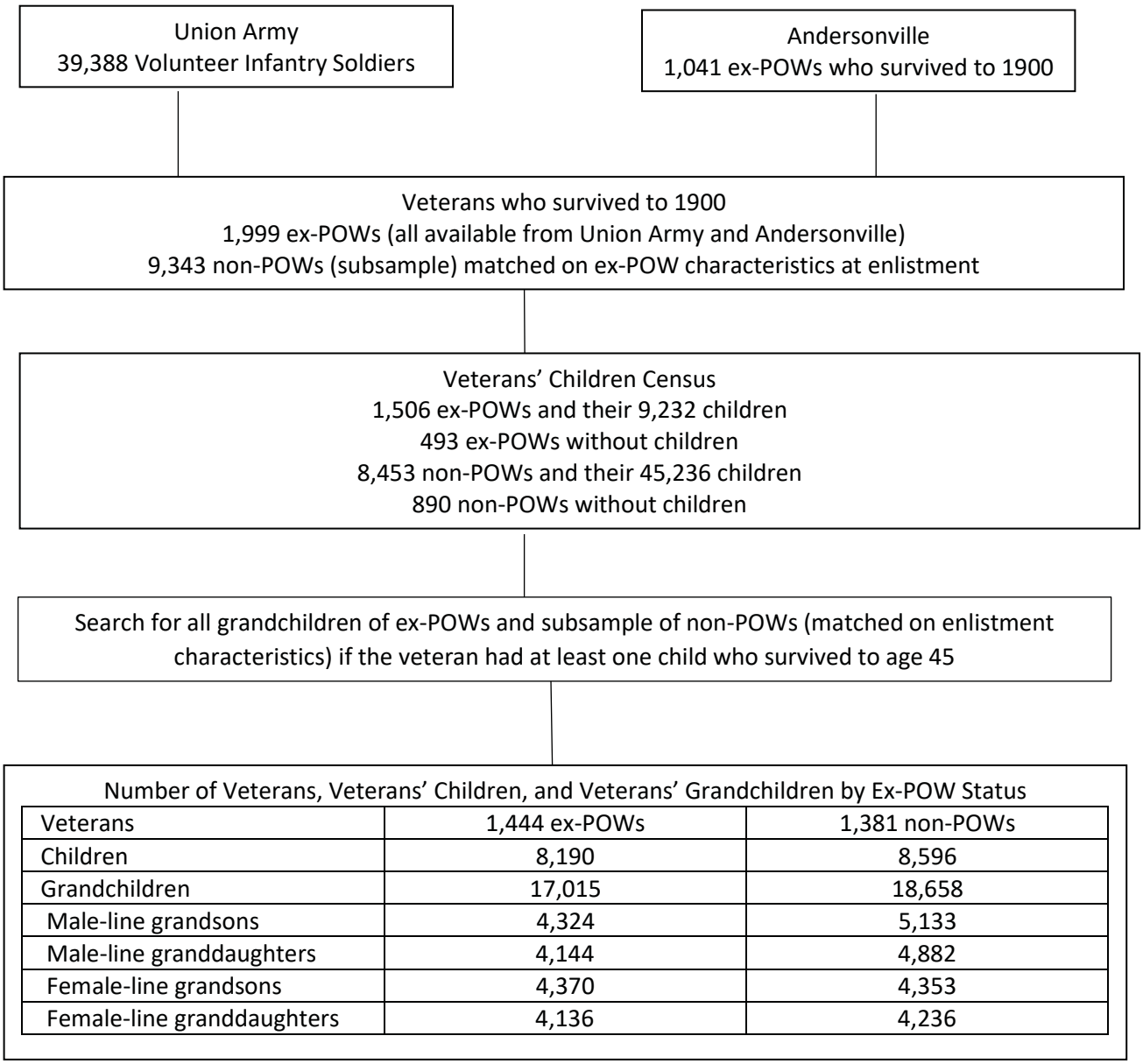
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Figure 1: Construction of the White Samples



Number of Veterans, Veterans' Children, and Veterans' Grandchildren by Ex-POW Status

Veterans	1,444 ex-POWs	1,381 non-POWs
Children	8,190	8,596
Grandchildren	17,015	18,658
Male-line grandsons	4,324	5,133
Male-line granddaughters	4,144	4,882
Female-line grandsons	4,370	4,353
Female-line granddaughters	4,136	4,236

Figure 2: Construction of the Black Sample

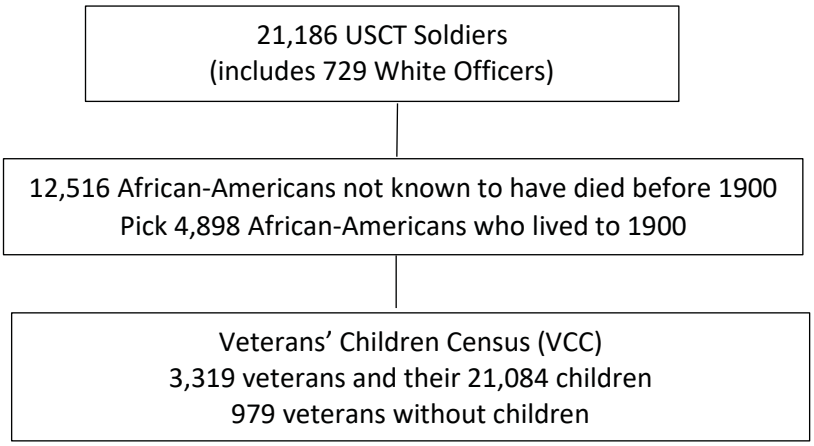


Figure 3: Counties of Residence Circa Age 40, Veterans and Veterans' Children

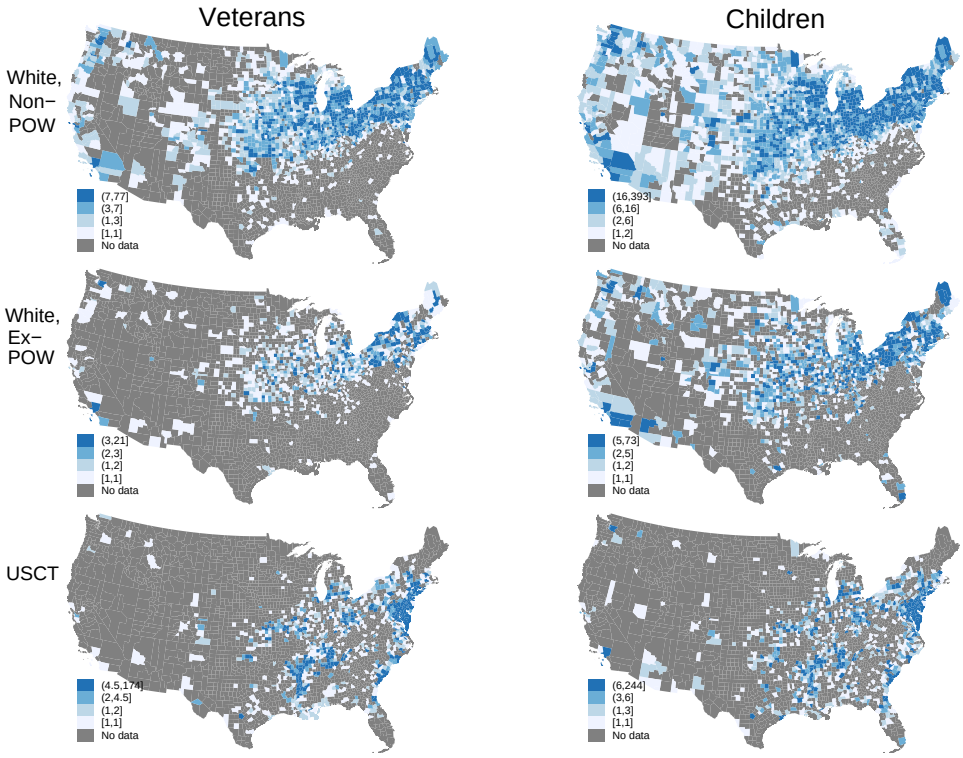


Figure 4: Birth and Death Counties of Veterans' Grandchildren

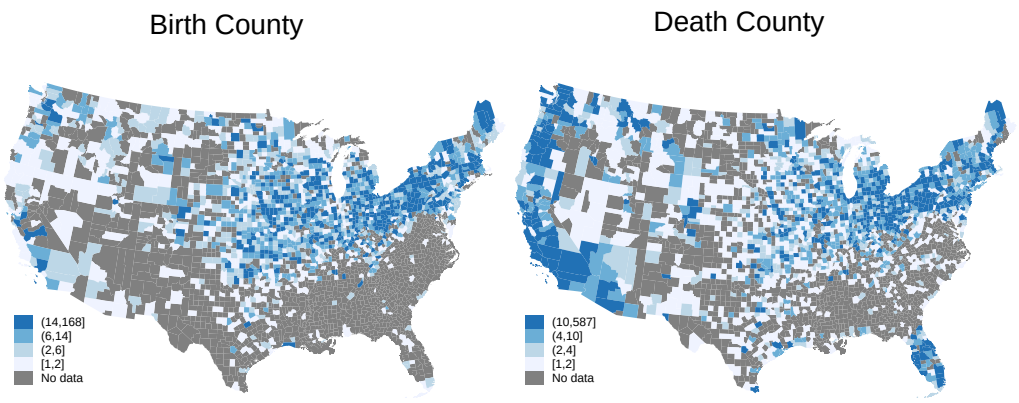


Table 1: Linkage Rates, VCC Samples

Children of	White Ex-POWs		White Non-POWs		Black USCT	
	Son	Daughter	Son	Daughter	Son	Daughter
Fraction						
with birth year	0.83	0.76	0.81	0.75	0.42	0.34
with death year	0.84	0.78	0.81	0.75	0.42	0.34
with death year and living or with missing death year						
linked to Census of						
1850	0.81	0.78	0.72	0.73	0.24	0.23
1860	0.84	0.84	0.82	0.80	0.30	0.30
1870	0.87	0.84	0.84	0.84	0.75	0.75
1880	0.91	0.91	0.90	0.89	0.83	0.82
1900	0.82	0.82	0.81	0.80	0.60	0.57
1910	0.78	0.76	0.78	0.74	0.47	0.41
1920	0.78	0.73	0.76	0.71	0.39	0.32
1930	0.75	0.69	0.74	0.67	0.33	0.26
1940	0.66	0.60	0.64	0.58	0.24	0.19
with death year and living						
linked to Census of						
1850	0.80	0.80	0.75	0.75		
1860	0.84	0.83	0.82	0.81	0.40	0.42
1870	0.88	0.86	0.85	0.86	0.76	0.78
1880	0.93	0.94	0.92	0.93	0.87	0.88
1900	0.87	0.90	0.87	0.90	0.74	0.74
1910	0.85	0.87	0.86	0.89	0.69	0.68
1920	0.87	0.87	0.86	0.88	0.65	0.64
1930	0.86	0.85	0.87	0.87	0.64	0.62
1940	0.79	0.79	0.81	0.80	0.56	0.54

There were too few observations linked to 1850 among USCT VCC children to generate meaningful numbers.

Table 2: Variable Means, Veterans' Children

Children of	White Ex-POWs		White Non-POWs		Black USCT	
	Sons	Daughters	Sons	Daughters	Sons	Daughters
Birth year	1875.08	1875.34	1873.53	1873.54	1876.73	1877.13
Death year	1938.00	1940.01	1936.73	1937.48	1935.32	1934.35
Years lived	64.76	66.66	65.14	65.91	58.64	58.09
Fraction with death cause						
if have death year	0.36	0.34	0.47	0.37	0.48	0.36
Region of birth						
New England	0.06	0.06	0.04	0.04	0.01	0.01
Middle Atlantic	0.22	0.21	0.19	0.20	0.14	0.14
East North Central	0.37	0.36	0.43	0.44	0.08	0.08
West North Central	0.20	0.21	0.18	0.17	0.06	0.06
Border	0.05	0.06	0.06	0.05	0.28	0.29
South	0.01	0.01	0.01	0.01	0.31	0.29
West	0.01	0.01	0.01	0.01	0.00	0.00
Other/unknown	0.07	0.08	0.07	0.07	0.12	0.13
Number of brothers	2.91	3.22	2.99	3.26	3.29	3.54
Number of sisters	3.14	2.84	3.18	2.90	3.55	3.24
Father owns real estate in 1870	0.43	0.41	0.47	0.47	0.10	0.10
Value of real estate owned	1777.10	1854.20	1904.21	1924.66	733.13	828.78
Father has personal property wealth in 1870	0.66	0.63	0.67	0.67	0.20	0.20
Value of personal property wealth owned	599.84	585.73	564.37	574.00	222.48	222.81
Father's occupation in 1880						
Farmer	0.50	0.47	0.53	0.52	0.27	0.26
Professional/proprietor	0.09	0.10	0.08	0.08	0.02	0.03
Artisan	0.14	0.16	0.13	0.13	0.04	0.05
Laborer	0.26	0.27	0.24	0.24	0.64	0.65
Not in labor force/unclassifiable	0.01	0.02	0.02	0.02	0.03	0.02
Own or husband's occupation c. age 45						
Farmer	0.22	0.27	0.24	0.30	0.17	0.22
Professional/proprietor	0.24	0.28	0.23	0.23	0.06	0.06
Artisan	0.19	0.18	0.18	0.18	0.06	0.06
Laborer	0.31	0.24	0.31	0.25	0.67	0.63
Not in labor force/unclassifiable	0.04	0.03	0.04	0.03	0.05	0.03

Table 3: Comparison of Veteran Characteristics with General Population

	Whites			Blacks		
	IPUMS	IPUMS, Re-weighted	Veterans	IPUMS	IPUMS, Re-weighted	Veterans
Age 22-40 in 1870 and						
Fraction with real estate, 1870	0.31	0.34	0.35	0.04	0.05	0.07
Value of real estate owned	3037.95	3444.10	785.36	635.31	572.60	625.48
Fraction with personal property wealth, 1870	0.48	0.53	0.58	0.14	0.13	0.15
Value of personal property wealth owned	1064.31	1122.32	585.80	230.39	231.43	2017.01
Age 32-50 in 1880 and						
Occupation in 1880, Percent						
Farmer	35.84	39.36	48.20	33.66	29.08	20.59
Professional/proprietor	17.10	19.66	11.97	2.35	2.47	2.85
Artisan	14.99	15.04	14.43	4.21	4.31	4.74
Laborer	29.51	23.25	24.71	57.10	61.66	69.14
Not in labor force/unclassifiable	2.56	2.68	0.70	2.68	2.48	2.68

IPUMS=Integrated Public Use Microdata Series (Ruggles et al., 2022) and use the 1% micro census samples. Weights were constructed from the birth state distribution of veterans. Veterans include those without children.

Table 4: Life Expectancy, Veterans' Children

	White				Black	
Age	Ex-POW b. 1870-79	Non-POW b.1870-79	ILAS b.1870-79	SSA 1900	USCT b.1870-79	Period 1935-1939
			Men			
0	63	66	52	52	57	52
10	56	59	53	56	49	48
20	49	50	45	47	42	39
30	41	41	39	39	34	32
40	33	33	32	31	27	25
50	25	25	25	23	21	19
60	18	18	18	16	15	14
70	12	12	12	11	11	9
80	8	7	8	7	7	6
			Women			
0	66	66	51	58	57	54
10	61	60	52	62	51	50
20	52	51	45	53	42	41
30	43	43	39	46	34	34
40	36	35	33	38	28	27
50	28	27	27	29	22	21
60	20	20	19	22	17	15
70	15	14	13	15	12	10
80	9	9	8	9	9	6

Table 5: Variable Means, Veterans' Grandchildren

	Grand-sons	Grand-daughters
Fraction		
with birth year	1.00	0.99
with death year	0.95	0.90
Birth year	1905.65	1905.61
Death year	1970.60	1976.31
Years lived	65.12	71.09

Table 6: Life Expectancy, Veterans' Grandchildren

Age	UA 1890-1909	SSA 1900	UA 1910-1929	SSA 1920
		Men		
0	67	52	70	62
10	59	56	62	60
20	51	47	53	52
30	43	39	44	43
40	34	31	35	34
50	25	23	27	26
60	18	16	19	18
70	12	11	13	12
80	8	7	9	7
		Women		
0	75	58	77	69
10	67	62	69	67
20	58	53	60	58
30	50	46	51	49
40	42	38	41	40
50	33	29	32	31
60	25	22	24	23
70	18	15	17	15
80	13	9	11	9

ON-LINE APPENDIX

Table A.1: Occupational Transitions: White, Non-POW Veterans in 1880 and Sons in 1920

		Son's occupation group in 1920								
		Farmer	Professional, proprietor	Farm worker	Laborer	Artisan	Clerical, sales	No job	Missing	Total
Veteran's occupation group in 1880	Farmer	2577	782	398	661	1633	647	356	48	7102
	%	**36.29**	11.01	5.6	9.31	22.99	9.11	5.01	0.68	100
	Professionals,	71	217	4	26	181	174	50	0	723
	proprietors, %	9.82	**30.01**	0.55	3.6	25.03	24.07	6.92	0	100
	Farm worker	93	34	32	50	131	43	26	1	410
	%	22.68	8.29	**7.8**	12.2	31.95	10.49	6.34	0.24	100
	Laborer	218	120	59	234	545	141	49	2	1368
	%	15.94	8.77	4.31	**17.11**	39.84	10.31	3.58	0.15	100
	Artisans	245	391	51	253	1139	379	115	17	2590
	%	9.46	15.1	1.97	9.77	**43.98**	14.63	4.44	0.66	100
	Clerical, sales	25	98	5	18	116	76	15	1	354
	%	7.06	27.68	1.41	5.08	32.77	**21.47**	4.24	0.28	100
	No	10	12	1	6	24	14	5	0	72
	job, %	13.89	16.67	1.39	8.33	33.33	19.44	6.94	0	100
	Missing	168	107	54	112	257	93	38	3	832
	%	20.19	12.86	6.49	13.46	30.89	11.18	4.57	0.36	100
	Total	3407	1761	604	1360	4026	1567	654	72	13451
	%	25.33	13.09	4.49	10.11	29.93	11.65	4.86	0.54	100

Table A.2: Occupational Transitions: White, Non-POW Veterans in 1880 and Sons-in-Law in 1920

		Son-in-law's occupation group in 1920								
		Farmer	Professional, proprietor	Farm worker	Laborer	Artisan	Clerical, sales	No job	Missing	Total
Veteran's occupation group in 1880	Farmer	1929	534	170	359	1105	422	312	10	4841
	%	**39.85**	11.03	3.51	7.42	22.83	8.72	6.44	0.21	100
	Professionals,	65	166	4	15	112	117	33	0	512
	proprietors, %	12.7	**32.42**	0.78	2.93	21.88	22.85	6.45	0	100
	Farm worker	87	23	10	36	85	29	12	2	284
	%	30.63	8.1	**3.52**	12.68	29.93	10.21	4.23	0.7	100
	Laborer	167	97	35	112	347	73	48	9	888
	%	18.81	10.92	3.94	**12.61**	39.08	8.22	5.41	1.01	100
	Artisans	256	337	26	135	710	244	97	7	1812
	%	14.13	18.6	1.43	7.45	**39.18**	13.47	5.35	0.39	100
	Clerical, sales	37	66	2	12	76	48	17	0	258
	%	14.34	25.58	0.78	4.65	29.46	**18.6**	6.59	0	100
	No	8	13	1	6	14	3	3	0	48
	job, %	16.67	27.08	2.08	12.5	29.17	6.25	6.25	0	100
	Missing	164	76	15	53	175	45	23	1	552
	%	29.71	13.77	2.72	9.6	31.7	8.15	4.17	0.18	100
	Total	2713	1312	263	728	2624	981	545	29	9195
	%	29.51	14.27	2.86	7.92	28.54	10.67	5.93	0.32	100

Table A.3: Occupational Transitions: Black, Non-POW Veterans in 1880 and Sons in 1920

		Son's occupation group in 1920								
		Farmer	Professional, proprietor	Farm worker	Laborer	Artisan	Clerical, sales	No job	Missing	Total
Veteran's occupation group in 1880	Farmer	280	43	104	170	85	69	69	1	821
	%	**34.1**	5.24	12.67	20.71	10.35	8.4	8.4	0.12	100
	Professionals,	4	10	2	12	13	11	5	1	58
	proprietors, %	6.9	**17.24**	3.45	20.69	22.41	18.97	8.62	1.72	100
	Farm worker	117	11	75	110	57	64	15	3	452
	%	25.88	2.43	**16.59**	24.34	12.61	14.16	3.32	0.66	100
	Laborer	129	33	100	300	176	187	67	6	998
	%	12.93	3.31	10.02	**30.06**	17.64	18.74	6.71	0.6	100
	Artisans	18	16	12	79	93	70	13	0	301
	%	5.98	5.32	3.99	26.25	**30.9**	23.26	4.32	0	100
	Clerical, sales	5	9	7	39	25	57	8	1	151
	%	3.31	5.96	4.64	25.83	16.56	**37.75**	5.3	0.66	100
	No	3	1	2	6	1	2	0	0	15
	job, %	20	6.67	13.33	40	6.67	13.33	0	0	100
	Missing	42	12	41	97	63	42	30	4	331
	%	12.69	3.63	12.39	29.31	19.03	12.69	9.06	1.21	100
	Total	598	135	343	813	513	502	207	16	3127
	%	19.12	4.32	10.97	26	16.41	16.05	6.62	0.51	100

Table A.4: Occupational Transitions: Black, Non-POW Veterans in 1880 and Sons-in-Law in 1920

		Son-in-law's occupation group in 1920								
		Farmer	Professional, proprietor	Farm worker	Laborer	Artisan	Clerical, sales	No job	Missing	Total
Veteran's occupation group in 1880	Farmer	174	13	34	75	53	37	11	1	398
	%	**43.72**	3.27	8.54	18.84	13.32	9.3	2.76	0.25	100
	Professionals,	6	3	0	3	5	6	0	0	23
	proprietors, %	26.09	**13.04**	0	13.04	21.74	26.09	0	0	100
	Farm worker	52	8	42	62	35	18	5	1	223
	%	23.32	3.59	**18.83**	27.8	15.7	8.07	2.24	0.45	100
	Laborer	72	11	41	159	76	105	15	2	481
	%	14.97	2.29	8.52	**33.06**	15.8	21.83	3.12	0.42	100
	Artisans	20	10	8	40	50	42	3	0	173
	%	11.56	5.78	4.62	23.12	**28.9**	24.28	1.73	0	100
	Clerical, sales	6	8	1	24	14	27	5	0	85
	%	7.06	9.41	1.18	28.24	16.47	**31.76**	5.88	0	100
	No	1	0	0	0	0	4	0	0	5
	job, %	20	0	0	0	0	80	0	0	100
	Missing	53	5	16	50	27	23	7	1	182
	%	29.12	2.75	8.79	27.47	14.84	12.64	3.85	0.55	100
	Total	384	58	142	413	260	262	46	5	1570
	%	24.46	3.69	9.04	26.31	16.56	16.69	2.93	0.32	100