Article

Slave Past, Modern Lives: An Analysis of the Legacy of Slavery and Contemporary Life Expectancy in the American South

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Abstract

As questions about racial reparations have entered public and political discourse again, research about the long-term impact of chattel slavery—so called "legacy of slavery" research—has taken on new significance. Over the past two decades researchers have identified direct quantitative links between slavery and a number of contemporary social and economic outcomes, including income, poverty, home ownership, school segregation, crime, educational inequality, and political polarization. Recently, however, researchers have begun to connect slavery to contemporary health outcomes, showing the legacy of slavery seems to stunt the health of black Americans while bolstering the health of white Americans. This manuscript builds on that recent research by examining the connection between subnational variation in the density of slavery and life expectancy in the American South. Using a variety of data sources, such as the US Census, American Community Survey (ACS), the United States Department of Agriculture Economic Research Service, and the Robert Wood Johnson Foundation County Health Rankings, and spatially robust OLS regression analysis, I find that in southern counties where slavery was denser black

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life expectancy remains proportionally lower and white life expectancy remains proportionally higher than in southern counties where slavery was less dense.

Keywords
life expectancy, race and racism, racial health disparities, slavery

Introduction

With the movement for reparations for American descendants of slavery again gaining traction in the United States, quantitative research on the long-term impacts of chattel slavery is perhaps more important than ever (Darity & Mullen, 2020). While there has been a noticeable spike in such research over the past decade, which has yielded some important new understandings of the connections between our past and present, it still lags behind other areas of research in the social sciences, which is often less concerned with historical phenomena than contemporary (Patterson, 2019). However, with burgeoning policy implications, so-called "legacy of slavery" research must continue to expand in general and, in particular, beyond its typical topics of inquiry.

Chattel slavery in the United States was what Goffman (1968) may call a "total institution" (Becker, 2003). In many places in the slave South, antebellum society was organized chiefly around the workings of slave life. Indeed, slavery was the primary reason for settling parts of what was then the western frontier—from West Georgia to East Texas (Cobb, 1992). In such places, banking, transportation, education, healthcare all revolved around slavery to various degrees, and even people who were not slave owners were involved tangentially through these other means (Merritt, 2017). Viewing slavery through this lens, considering it the central feature of a total institution offers a window to explain how the legacy of slavery continues to touch so many disparate parts of society. Slavery was not merely an economic institution; it was not merely a labor institution; it was a *total* institution that engulfed nearly every part of life in the local area. This ultimately means legacy of slavery researchers should expect most parts of society, particularly the South, to experience long-term impacts of chattel slavery and broaden their investigations to include a wider variety of subjects.

Legacy of slavery research primarily concentrates in a few areas. The most prominent area is economic outcomes, where researchers have taken a variety of approaches to gaining a comprehensive view of the transatlantic slave trade, including cross-national and subnational comparisons of the impact of slavery

(see Reece, 2020 for a review). Three other areas: education, violence, and politics follow economics, and in each of these areas as well, researchers make both subnational and cross-national comparisons to understand the impact of chattel slavery and the slave trade. Yet, until recently health research has lagged considerably behind these other areas, but it now seeks to fill a glaring hole in our understanding of health and the comprehensive long-term impact of slavery.

Considering the number of researchers examining health and the depth of our collective knowledge of racial health disparities it may be unusual that few other health researchers have adopted a legacy of slavery approach—empirically connecting chattel slavery to contemporary outcomes—to the quantitative study of health, after all the National Institutes of Health (NIH) alone invests billions of dollars annually into health-related research. Health is one of the primary ways black Americans experience racism, as their quality of life and length of life are often dramatically diminished relative to their white counterparts (Williams et al., 2003). Life expectancy, in particular, captures, in large part, the totality of health experiences and the gap between black and white life expectancy represents the culmination of a literal lifetime of inequality. These differences are particularly acute in the Southern United States, where overall life expectancy continues to lag behind the rest of the country, and black life expectancy is even lower than other places (Arias et al., 2021). American chattel slavery is among the more readily identifiable historical differences between the South and other parts of the country and local variations in the concentration of enslaved people across counties in the South can inform our specific understanding of how slavery may continue to shape life expectancy and racial differences in southern life expectancy. Particularly, the South's unique history of medical experimentation on enslaved black people may continue to shape how black people interact with the healthcare system in ways that influence life expectancy even when controlling for healthcare access, occupational hazards, other forms of racism, environmental hazards, and neighborhood safety. With that in mind, this manuscript seeks to continue to expand legacy of slavery research into the study of health and racial health disparities by examining the connection between the number of enslaved people in counties in former slave states and life expectancy among black and white people living in those same places today. Consistent with previous research (e.g., O'Connell, 2012; Reece & O'Connell, 2016). I use slave density as a proxy for the legacy of slavery, and I conceptualize it as the proportion of enslaved people in a county relative to the entire county population in 1860, the last Census available before slavery was abolished—such that a measure of .4 indicates that 40% of *all of the people* in the county were enslaved—and I combine this with a number of

variables to control for alternate explanations of racial differences in life expectancy and geographically focused OLS regression to isolate the impact of the legacy of slavery on contemporary life expectancy across former slave states in the United States.

The Legacy of Slavery and Subnational Variation

Legacy of slavery research is the study of the long-term impacts of the transatlantic slave trade and chattel slavery. Researchers use a variety of different approaches and examine this at different scales but topically, the research tends to focus on a few established areas. Most legacy of slavery research takes aim at economic outcomes (Lagerlöf, 2005; O'Connell, 2012, 2020; O'Connell et al., 2020; Reece, 2018, 2020; Ruef & Fletcher, 2003; Sacerdote, 2005; Zajonc, 2002). Education trails economics as a topic among legacy of slavery researchers (Bertocchi & Dimico, 2012, 2014; Reece & O'Connell, 2016). And a number of researchers also examine the connection between slavery and violence and slavery and politics (Acharya et al., 2016; Gouda & Rigterink, 2016; Gunadi, 2019; Price et al., 2008; Vandiver et al., 2007).

However, the modern wave of quantitative legacy of slavery research has avoided health as a subject until recently. This glaring omission neglected the complex ways slavery impacted the health of enslaved people and their descendants in the years and decades following Emancipation (Downs, 2012). Recently, there has been an uptick in the amount of research seeking to connect slavery to contemporary health outcomes. A short call to action by Dozier and Munn (2020) link slavery and diabetes prevalence and preventable hospital stays in North Carolina, although they offer little detail about their methods and data. Therefore, the current study will primarily build on work by Kramer et al. (2017) and Esenwa et al. (2018). Kramer et al find that as the proportion of enslaved people relative to the overall southern county population increased, the decline of heart disease mortality for black people from 1968 to 2014 slowed. That means, on average, in southern counties where there were relatively more enslaved people in 1860 black people saw a smaller decrease from 1968 to 2014 in their likelihood of dying from heart disease as compared to counties where there were relatively fewer enslaved people. Southern counties with smaller relative proportions of enslaved people experienced a larger drop in heart disease mortality over the study period. For white people in the Upper South—Missouri, Arkansas, Tennessee, Kentucky, North Carolina, Virginia, West Virginia, Maryland, and Delaware— higher proportions of enslaved people relative to the overall population predicted faster declines in heart disease mortality from 1968 to 2014. That means on average white people in the Upper South experienced proportionally better health outcomes in counties

with higher relative proportions of enslaved people. Similarly, Esenwa et al. (2018) find that the proportion of enslaved people relative to the overall population in a county positively correlates with black stroke mortality but negatively correlates with white stroke mortality. That means, on average, southern counties with higher relative proportions of enslaved people in 1860 experience higher rates of black stroke mortality but lower rates of white stroke mortality. Both studies point to black people continuing to suffer the health consequences of places' slave pasts while white people continue to benefit from places' slave pasts.

The current study continues this exploration of the legacy of slavery and contemporary health outcomes by examining the importance of slavery as a predictor of black and white life expectancy and the gap in black-white life expectancy in the American South. White people tend to live longer than their black counterparts, but their life expectancies vary by place (see Figure 1). I seek to understand the role of slavery in explaining this local variation in life expectancy.

## The Importance of Subnational Variation

Although the United States was, as a whole, entrenched in the institution of slavery, with large swaths of the economy, even seemingly innocuous industries like insurance and higher education, drawing profits from the trade of human chattel (Nelson, 2016; Wilder, 2013), there was great variation in the direct exposure to slavery. The largest difference stems from the legality of slavery. People and institutions in slave states were considerably more likely to be directly connected to slavery, experience direct contact with enslaved people, and have their local institutions and culture shaped by slavery. Even non-slaveowning white people were forced to recon with the impact of slavery on their livelihoods (Bonacich, 1975; Merritt, 2017).

These types of pressures also varied at a smaller scale. Among slave states, from locality to locality there were great differences in the number of enslaved people in the community. Some places had no slaves at all, while in other places 90% of the population was enslaved (see Figure 2 for a visual of the proportion of enslaved people relative to the overall county population in 1860). These differences fueled local variation in historical pressures and processes and ultimately facilitated variation in social and economic outcomes in contemporary America. I plan to leverage this variation between counties in slave states to isolate the impact of slavery on contemporary life expectancy, which will allow researchers to begin to parse out specific causal mechanisms in the American South where black life expectancy tends to be lower. If slavery is associated with health outcomes at the county level among
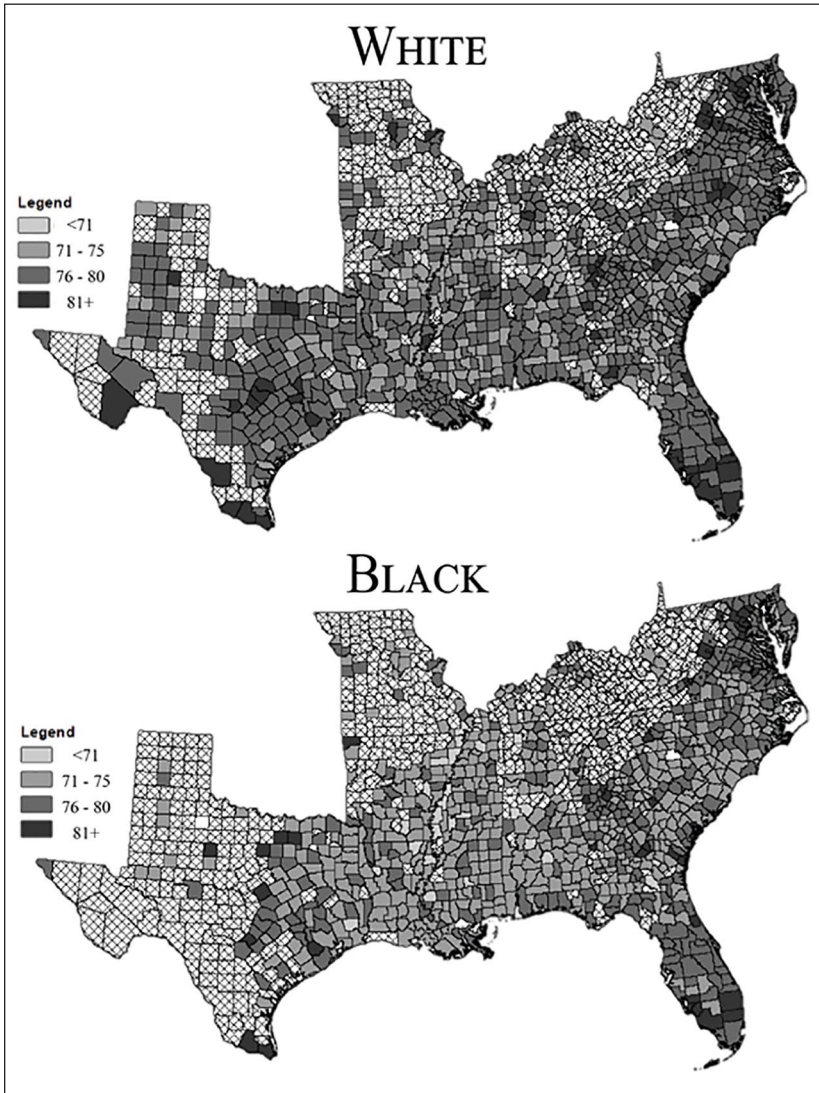
Figure 1. Life expectancy by county by race in former slave states.

slave states we can better understand the role of direct contact with slavery in shaping the long-term outcomes of places. Furthermore, the county has been identified as an ideal unit of analysis for historical path dependency process
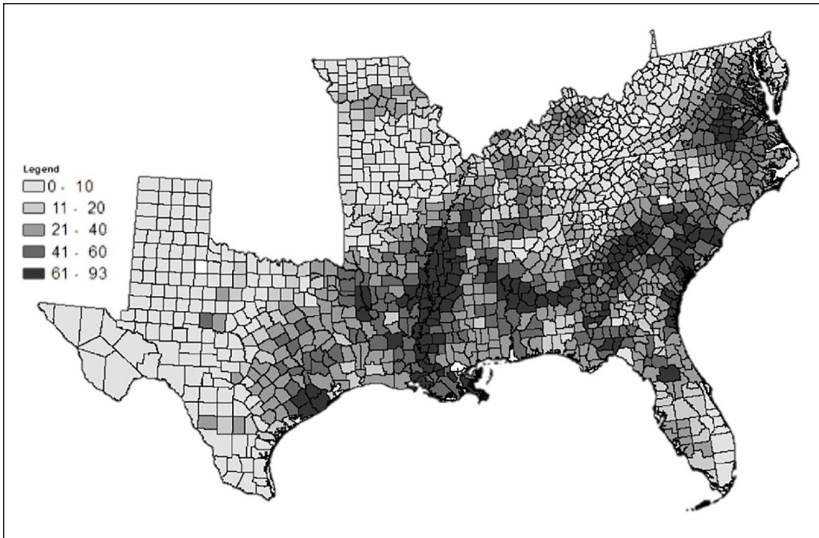
Figure 2. Proportion of slaves by county in 1860.

such as this because of its central role in government administration in the South and rural areas (Lobao & Hooks, 2007; Petersen & Ward, 2015).

Health and the Legacy of Slavery

While Goffman's idea of total institutions has been applied widely, and arguably misapplied in many cases (Davies, 1989), it offers an ideal framework for conceptualizing chattel slavery in the United States. Goffman (1968) defines a total institution as "a place of residence and work where a large number of like-situated individuals cut off from the wider society for an appreciable period of time together lead an enclosed formally administered round of life" (p. 11). Enslaved people worked and lived in places that were isolated from the rest of society and completely governed by the whims of their owners, who had the legal discretion to buy, sell, punish, and humiliate them, manage their work and living schedules, and either administer or deny them healthcare. However, unlike the asylums Goffman studied, chattel slavery, while isolating for enslaved people, grew to encompass nearly all aspects of local life. This gave planters and slave owners an outsized level of control over local politics, both during and after Emancipation, and created local investment in the institution—and the power dynamics therein—that

would persist even as it was dismantled. This investment was economic, to be sure, but it was also emotional as people built identities and relationships based on the institutional structure, which would increase their desire to salvage as much of it as possible in the wake of Emancipation (Pierson, 2004; Ruef, 2014).

The health of chattel slaves in the United States was fraught with contradictions. While it may seem that slave owners had an economic interest in preserving the health of enslaved people so they could continue to work efficiently, that was rarely the reality. Enslaved women were typically forced to work right up until it was time for them to give birth and often required to return to work soon after. If they suffered complications or illness they were subject to grotesque and inhumane medical experimentation (Cooper-Owens, 2017). Children were then generally squeezed into tight, unhygienic quarters under the supervision of an older enslaved woman where they risked disease and infection, leading to high mortality rates and small sizes and malnourishment for the survivors (Coelho & McGuire, 1999). Adult enslaved people lacked access to the little proper healthcare available in the 18th and 19th centuries and resorted to treating themselves or managing sometimes disturbing conditions, such as the case of a 90-year-old enslaved woman who had trouble urinating for so long that calcified urine began to accumulate around her genitals (Cooper-Owens, 2017). The lack of concern for enslaved people's health and their generally poor health relative to white people is evident in studies of slave heights that found enslaved people to be markedly shorter than white people and free black people, a sign of malnourishment (Coelho & McGuire, 1999; Margo & Steckel, 1982).

Black Americans' health prospects, particularly in former slave states, changed little after Emancipation. During the Civil War freed slaves were routinely ignored by Union troops, who were given no orders to even feed them unless they were employed as Union soldiers or support staff (Downs, 2012). And across the South, people remained invested in ideas about the value of black health that had been borne out of the total institution of chattel slavery and sought to imbue emerging institutions with similar ideas and priorities. During Reconstruction the low priority of black health prevailed from the antebellum years, namely that black people should be kept just alive and healthy enough to work but not so healthy that they become a drain on resources or attempt to flee to the north (Downs, 2012). These priorities persisted over the following century as exemplified by vital statistics. For example, in Mississippi in 1963 black infant mortality was about 53 per 1,000 while white infant mortality was about 23 per 1,000. In 1964, maternal mortality was primarily concentrated among black women, with black mothers accounting for 48 of the 57 total maternal deaths in the state. And black

children continued to suffer as 1,631 black children died in their first year of life, which comprised roughly 16% of the total black deaths in Mississippi in 1964. In contrast, the only 599 white children who died during their first year of life in 1964 accounted for only 5% of white deaths that year (Reece, Forthcoming). Indeed, when sharecropper strikes began to organize across Mississippi and the South in the mid-1960s, one of their most prominent concerns was better healthcare, including a demand that plantation owners fund healthcare services, which they had been loathe to do, again reflecting the low priority of black health concerns (Reece, Forthcoming). Plantation owners' reluctance to provide healthcare for their black workers and how their priorities shaped the priorities of entire localities reflects the ongoing influence of slavery as a total institution with elements that were continuously replicated after Emancipation. Plantation owners maintained the power to not only decide how they would treat black workers but how other local people would treat black workers, and these ideas, that once may have been instrumental, became hegemonic and continued to shape black health outcomes through the 1960s into the present day.

In southern counties where enslaved people were a larger proportion of the local population the health and safety of local black people may continue to suffer. Some previous legacy of slavery research already suggests that in the absence of identifiable institutional mechanisms, the impact of slavery on contemporary social outcomes may be through its impact on local priorities and behaviors. That is, behaviors and priorities established during chattel slavery can become entrenched in local communities and continue to influence social and economic outcomes long after the institution was dismantled. For example, Reece and O'Connell (2016) find a positive association with concentration of slaves in southern counties in 1860 and white flight from public schools to private schools contemporarily. This association was robust to, and indeed, unrelated to, institutional controls such as the proportional number of private schools in the area, public school spending, and public school test scores. As a result, the authors suggest that slavery and its resulting history may have primed the local white populations to avoid schooling with black people, thus the rush to flee public schools where there are more black people. Similarly, southern counties' slave history, independent of other forms of racial animus, may have made black people wary of the type of treatment they may receive from white healthcare providers who sought to minimize the healthcare concerns of black people. In response to this wariness, black people in counties with a stronger legacy of slavery may be more likely to avoid healthcare services. Because of a long history of medical mistreatment, black Americans already often avoid frequenting healthcare providers for fear of racist encounters with healthcare workers (Paradies et al.,

2014; Wilkins et al., 2013), and this fear and the resulting avoidance may be more acute when combined with a stronger legacy of slavery.

However, the legacy of slavery is about more than black disadvantage. Building on Reece (2020) and Esenwa et al. (2018), the legacy of slavery may also serve to bolster white health outcomes. As aforementioned, Reece (2020) shows that concentration of slaves in southern counties positively correlates with white economic outcomes, and Esenwa et al. (2018) show that concentration of slaves in southern counties negatively correlates with white stroke mortality so there is an empirical precedent for me to expect that white life expectancy may be higher in places with a stronger legacy of slavery. This is the converse of the impact of deprioritizing black health outcomes: prioritizing white health outcomes. Assari (2017) shows that social contacts increase life expectancy for white people (but not black people) and they suggest that health resources are more strongly catered to the needs of white people and thus work better in their favor. Places with stronger legacies of slavery may have increased emphasis on maintaining the health of the local white population, and social networks in places that prioritize the specific needs of white people may further increase white people's life expectancies.

This two-pronged approach, where black people are disadvantaged as white people are advantaged would exacerbate life expectancy inequality between the two groups.

> *Hypothesis 1: I hypothesize that in former slave states, counties with a higher proportion of enslaved people relative to the overall county population in 1860 will exhibit proportionally larger black-white differences in life expectancy between 2016 and 2018 than counties with a lower proportion of enslaved people in 1860.*
> *Hypothesis 2: I hypothesize that in former slave states, counties with a higher proportion of enslaved people relative to the overall county population in 1860 will exhibit lower black life expectancy between 2016 and 2018 than counties with a lower proportion of enslaved people in 1860.*
> *Hypothesis 3: I hypothesize that in former slave states, counties with a higher proportion of enslaved people relative to the overall county population in 1860 will exhibit higher white life expectancy between 2016 and 2018 than counties with a lower proportion of enslaved people in 1860.*

Data and Methods

My data come from a variety of places, but many of my variables, including my outcomes variables—life expectancy—were aggregated by the 2020

Robert Wood Johnson Foundation's County Health Rankings and Roadmaps. Other data come from the 1860 United States Census, the 2014 to 2018 American Community Survey (ACS), the 2018 Census Population Estimates, and the United States Department of Agriculture Economic Research Service (USDA ERS). Consistent with my focus on the South and former slave states, I included every county or county equivalent (like parishes in Louisiana) in 1860 slave states: Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, Texas, Virginia, and West Virginia, yielding a total of 1,455 counties. I excluded counties with missing data for the dependent variables, which I explain in detail below.

My focal independent variable is the proportion of each Southern county's total population that was enslaved in 1860. That means that in a county with value of .9, 90% of all the people in the county were enslaved and 10% were free. However, matching county-level data across time can be difficult because county boundaries often shift over time. For this study the county-level slavery data from 1860 was reallocated geographically to match contemporary county boundaries following O'Connell (2012) and Reece and O'Connell (2016). See either of those papers for full details of this method.

My dependent variables are based on life expectancy calculated by the County Health Rankings using National Center for Health Statistics mortality files from 2016 to 2018. Counties with fewer than 5,000 life years, roughly 67 respondents, were coded as missing. This is important because a measure such as life expectancy can be heavily skewed in places where there are only a few cases. After those omissions, there were 883 counties with values for black life expectancy and 990 counties with values for white life expectancy. While this eliminates a fair number of counties from the analysis it ultimately does not limit the analysis in any way simply because there is no sensible way to analyze black life expectancy or life expectancy inequality in places where there are very few to no black people. The remaining counties provide more than enough variance in both the dependent and focal independent variables for a thorough and robust analysis. Relatedly, I also excluded counties missing important control variables, which left 792 total cases for black life expectancy and 870 cases for white life expectancy out of 1,455 total counties.

I use three dependent variables. First is life expectancy inequality, which is a ratio of black life expectancy to white life expectancy. A value of 1 indicates that black and white life expectancy are equal, while values below 1 mean that black people in the county tend to live shorter lives than white county residents, and values above 1 mean that black people in the county live longer lives on average than white people in the county. If life
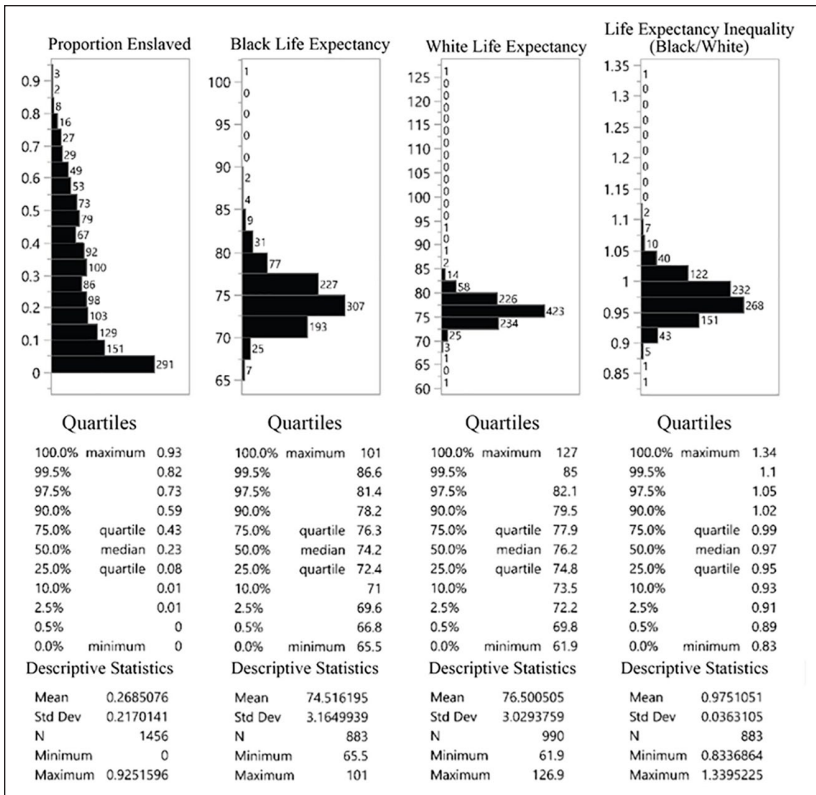
Figure 3. Histograms, quartiles, and descriptive statistics for focal variables.

Proportion Enslaved			Black Life Expectancy			White Life Expectancy			Life Expectancy Inequality (Black/White)		
Quartiles			**Quartiles**			**Quartiles**			**Quartiles**		
100.0%	maximum	0.93	100.0%	maximum	101	100.0%	maximum	127	100.0%	maximum	1.34
99.5%		0.82	99.5%		86.6	99.5%		85	99.5%		1.1
97.5%		0.73	97.5%		81.4	97.5%		82.1	97.5%		1.05
90.0%		0.59	90.0%		78.2	90.0%		79.5	90.0%		1.02
75.0%	quartile	0.43	75.0%	quartile	76.3	75.0%	quartile	77.9	75.0%	quartile	0.99
50.0%	median	0.23	50.0%	median	74.2	50.0%	median	76.2	50.0%	median	0.97
25.0%	quartile	0.08	25.0%	quartile	72.4	25.0%	quartile	74.8	25.0%	quartile	0.95
10.0%		0.01	10.0%		71	10.0%		73.5	10.0%		0.93
2.5%		0.01	2.5%		69.6	2.5%		72.2	2.5%		0.91
0.5%		0	0.5%		66.8	0.5%		69.8	0.5%		0.89
0.0%	minimum	0	0.0%	minimum	65.5	0.0%	minimum	61.9	0.0%	minimum	0.83
Descriptive Statistics			**Descriptive Statistics**			**Descriptive Statistics**			**Descriptive Statistics**		
Mean	0.2685076		Mean	74.516195		Mean	76.500505		Mean	0.9751051	
Std Dev	0.2170141		Std Dev	3.1649939		Std Dev	3.0293759		Std Dev	0.0363105	
N	1456		N	883		N	990		N	883	
Minimum	0		Minimum	65.5		Minimum	61.9		Minimum	0.8336864	
Maximum	0.9251596		Maximum	101		Maximum	126.9		Maximum	1.3395225	

expectancy was randomly distributed, about half of the counties would have values above one and about half would have values below 1, which would mean sometimes white people lived longer and sometimes black people lived longer. However, white life expectancy is longer in about 75% of counties. My other two dependent variables are black life expectancy and white life expectancy. See Figure 3 for descriptive statistics for the focal variables.

Control Variables

I also control for a number of other factors to isolate the effect of the legacy of slavery on life expectancy. These are factors that have either been shown to be influenced by the legacy of slavery or shown to shape life expectancy.

First, I include a group of county demographic variables. Black Percent is the percentage of county residents who identify as black in the 2018 Census Population Estimates, and I also included black percent squared because previous research suggests the effect of black proportion on social outcomes is often curvilinear (O'Connell, 2012). This is important because research shows that while proportion enslaved and proportion black are correlated they maintain independent effects on social outcomes (O'Connell, 2012.) Moreover, a robust literature on racial threat has established that the higher the proportion of black people in a locality, the worse local black social outcomes (Blalock, 1967). This may also be in play regarding life expectancy so it is important to account for. Persistent Poverty is a dichotomous variable from the USDA ERS that describes counties where 20% of the county's residents have been in poverty from 1980 through 2011. Slavery has also been shown to influence poverty and, in turn, poverty influences life expectancy (O'Connell, 2012; Singh & Lee, 2021). This is especially true of persistent poverty; the longer people live in poverty, the more if affects their lives (Moss et al., 2020). Therefore, if I aim to isolate the impact of slavery I need to control for poverty. Rural-Urban Continuum is another USDA ERA variable that measures urbanization on a scale from 1 to 9 with 1 representing the most urban counties and 9 representing the most rural counties, and others falling somewhere in between. Research shows that health outcomes often differ sharply based on rurality, with people in rural areas generally having shorter life expectancies (Singh & Siahpush, 2014). Because slavery was highly concentrated in rural areas it is vital to control for this aspect of the county to ensure any effect of slavery is not influenced by rurality. Seniors is the percentage of people who were 65 years old or older in the Census Population Estimates. This variable is unpredictable in this context because an older population may mean that life expectancy is longer or it may dampen overall life expectancy. Some College is the percentage of people in the county aged 25 to 44 with at least some college education according to the ACS. This is another variable that is both influenced by slavery and shapes life expectancy. Previous research shows that slavery negatively correlates with black educational attainment (Bertocchi & Dimico, 2012), but people who are more educated tend to have longer life expectancies (Singh & Lee, 2021). Again, it is important to control for education to isolate the relationship between slavery and life expectancy. And Household Income is the median household income according to the Census Small Area Income and Poverty Estimates. Similar to many of the other variables mentioned so far household income has also been shown to correlate with the legacy of slavery (Lagerlöf, 2005), and people with higher incomes tend to have longer life expectancies (Chetty et al., 2016), which makes this another important variable to include.

Next, I include variables that account for local access to healthcare and other health options. Food Environment Index is a variable from the County Health Rankings that measures the availability of quality food sources in the county and residents' ability to maintain a healthy diet; it is a scale from 0 to 10 with 10 representing the best food environments and 0 representing the worst. Exercise Access is another County Health Rankings metric that measures the percentage of people in 2019 with access to places where they can engage in physical activity. Both the quality of local food sources and the availability of exercise facilities can affect health outcomes, which ultimately shape life expectancy. Specifically, lack of access to food options and exercise worsens health outcomes (Ahern et al., 2011; Penedo & Dahn, 2005). Uninsured is the percentage of people without health insurance according to the Census Small Area Health Insurance Estimates. Insurance coverage has been shown to correlate with slave history (Reece, 2020) and it shapes people's ability to access appropriate healthcare, potentially leading to adverse health outcomes and shorter lives (Hoffman & Paradise, 2008). And Provider Access Index is the average of the population ratio of primary care physicians, population ratio of dentists, and population ratio of mental health providers; the three components of the index come from the County Health Rankings. I combined these metrics into a single index because they were highly correlated with each other and I wanted to keep my models parsimonious while not omitting key variables of healthcare access because they are strongly associated with health outcomes (Graves, 2008).

Next, I add two measures of local racial animus. The first is Black-White Segregation, which is a dissimilarity index measuring county level residential segregation, and the second is the percentage of votes in the county that went to the Republican candidate in 2016, drawn from the Voting and Elections Collection. These variables capture important confounding concepts. Racial segregation has been strongly associated with life expectancy (Hunt et al., 2015), and school segregation, if not residential segregation, has been linked to slavery (Reece & O'Connell, 2016). Republican vote share has also been linked to slavery (Acharya et al., 2016). Moreover, both segregation and Republican vote share in 2016 are correlated with anti-black attitudes (Algara & Hale, 2019), which are vital to account for if I seek to isolate the impact of slavery on life expectancy through a plausible causal mechanism where a slave history leads black people to be wary of healthcare. This helps me understand whether slavery is actually the driving factor or some form of animus that followed.

I then include a series of industry variables from the ACS to account for the relative risk of occupational hazards because certain occupations carry

greater risk of on-the-job injury and greater long-term health risks (Singh & Lee, 2021). Each variable—construction, manufacturing, wholesale trade, retail trade, transportation, information, finance, professional, education and healthcare, arts, other occupation, public administration—is the percentage of people in the county who work in that industry. I excluded agriculture as the reference category.

Next, I added a measure of environmental hazards. Black communities are more likely to live near environmental hazards (Stretesky & Lynch, 2002). Therefore, I used water violations as a proxy for whether the community was environmentally responsible. I reasoned that black people would be more likely to be affected by such violations and they may indicate that black people are otherwise vulnerable to local environmental hazards. Water Violation is a dichotomous variable adapted from the County Health Rankings that indicates whether a county had a drinking water violation in 2018 according to the Safe Drinking Water Information System.

I also added a measure of health behaviors. Health Behaviors is an average of the percentage of people who are smokers, physically inactive, receive insufficient sleep, and engage in excessive drinking, all as measured by the Behavioral Risk Factor Surveillance System. Controlling for health behaviors allows me to ensure that life expectancy is not being influenced by health behaviors that are known to decrease health related quality of life (Brady et al., 2013). I elected to average these behaviors because this study is not concerned with each specific behavior as much as how common any of them may be in general. Specifically, it does not matter to this study whether 30% of a county smokes and 50% drinks excessively or if 50% smokes and 30% drinks excessively. It only matters that people are participating in negative health behaviors.

Finally, I added two measures of neighborhood safety. First, is Violent Crime, which is the number of reported violent crimes per 100,000 in 2016 according to the FBI Uniform Crime Statistics. Black people are considerably more likely than white people to fall victim to violent crime, which partially influences their differences in life expectancies (Sharkey & Friedson, 2019), and violent crime rates has also been associated with slavery (Gouda & Rigterink, 2016), which makes it an important variable to account for. Second is Severe Housing Problems, which is a variable from County Health Rankings that measures the percent of households with at least one of the following problems: overcrowding, high housing costs, lack of kitchen facilities, or lack of plumbing facilities. Housing insecurity and other housing problems are strongly associated with health outcomes and may ultimately influence life expectancy (Singh & Lee, 2021).

See Table 1 for the full list of control variables and descriptive statistics.

Table 1. Descriptive Statistics for Control Variables.

Variable	Mean	SD
Demographics		
Black percent	16.3384	17.8161
Black percent squared	584.1400	1,066.0628
Persistent poverty	0.2033	—
Rural-urban continuum	4.7177	2.6574
Seniors	18.7770	4.5920
Some college	52.9096	11.3109
Household income	48,449.2082	13,717.7406
Health access		
Food environment index	7.1523	1.1329
Exercise access	56.6959	24.2878
Uninsured %	13.6966	5.1422
Provider access index	2,904.8357	2,058.3779
Ambient racism		
Black-White segregation	38.4018	15.3296
Republican votes 2016	64.8314	15.8031
Occupational hazards		
Construction	7.4526	2.4873
Manufacturing	12.5300	6.5621
Wholesale trade	2.3180	1.0752
Retail trade	11.7759	2.4297
Transportation	5.5762	2.0187
Information	1.3381	0.8095
Finance	4.5095	1.7994
Professional	6.9007	3.1220
Edu and healthcare	23.1127	4.3456
Arts	7.7556	3.3009
Other occupation	4.9219	1.2621
Public administration	6.2247	3.3573
Environmental hazards		
Water violations	0.3340	—
Health behaviors		
Health behaviors index	24.9791	2.1806
Neighborhood safety		
Violent crime	297.6662	210.2006
Severe housing problems	14.2678	3.4927

Analytic Strategy

Much of my analytic strategy was about managing spatial autocorrelation, which describes how cases in a data set are not truly independent if they are organized in geographic space in a way that localities, in this case counties, closer to one another are more similar than those farther away. With that in mind, I used the geospatial analysis software ArcGIS to conduct a Moran's I test on each of my dependent variables, which indicated that they are all spatially autocorrelated. To ensure my results were not biased, I conducted my analyses in ArcGIS, which allowed me to present OLS estimates that are spatially robust. I estimated a series of models to measure the relationship between slave concentration and life expectancy inequality, black life expectancy, and white life expectancy. I included each set of control variables—demographics, health access, ambient racism, occupational hazards, health behaviors, and neighborhood safety—in a stepwise fashion, yielding seven total models for each dependent variable and I present the final model, which includes all of the control variables, for each dependent variable here. I then use those models to generate predicted values in the SAS statistical software. Predicted values help readers better visualize and interpret results. I present histograms, quartiles, and scatterplots of my predicted values to supplement my regression analysis.

Results

See Table 2 for spatially robust OLS estimates for each of my dependent variables (the full step-wise models are available on request from the author).

The second column shows estimates for life expectancy inequality. My focal independent variable, proportion enslaved is negative and significant, which means, on average, slave state counties that had higher proportions of enslaved people had a lower black life expectancy relative to white life expectancy between 2016 and 2018. This relationship persists even when I control for a wide variety of other factors influencing life expectancy. This supports my first hypothesis and suggests that living in a county with stronger ties to slavery may widen the life expectancy gap between black and white people in former slave states.

The third column shows estimates for black life expectancy. Here, again, proportion enslaved is negative and significant, which means, on average, slave state counties that had higher proportions of enslaved people have lower black life expectancy between 2016 and 2018 even when I control for other factors. The coefficient is roughly 1.72, which means holding other factors constant a .1 increase in the proportion of slaves in a county accounts for

Table 2. Spatially Robust OLS Estimates for Life Expectancy.

| Variable	Life expectancy inequality (Black/White) β (SE)	Black life expectancy β (SE)	White life expectancy β (SE)
Intercept	.9196*** (0.0549)	71.2926*** (4.1573)	74.1440*** (2.3578)
Legacy of slavery			
Proportion enslaved	−.0427** (0.0084)	−1.7248* (0.6326)	1.8105** (0.3860)
Demographics			
Black percent	−.0001 (0.0003)	.0029 (0.0214)	.0080 (0.0129)
Black percent squared	.000003 (0.000004)	−.0001 (0.0003)	−.0004* (0.0002)
Persistent poverty	−.0046 (0.0039)	−.1188 (0.2977)	.3665 (0.1805)
Rural-urban continuum	−.0026** (0.0008)	−.1953** (0.0604)	.0066 (0.0361)
Seniors	−.0005 (0.0003)	.0379 (0.0254)	.0780** (0.0152)
Some college	−.0005 (0.0002)	−.0164 (0.0159)	.0183 (0.0094)
Household income	.0001 (0.0001)	.0001** (0.00002)	.0001*** (0.00001)
Health access			
Food environment	−.0024 (0.0020)	.0190 (0.1538)	.2055* (0.0912)
Exercise access	−.0001 (0.0001)	−.0057 (0.0060)	.0004 (0.0035)
Uninsured %	.0007 (0.0004)	.1266** (0.0293)	.0631** (0.0172)
Provider access	.0001 (0.000001)	.0001 (0.00005)	.00002 (0.00003)
Ambient racism			
Black-White segregation	−.0003** (0.0001)	−.0186* (0.0083)	.0068 (0.0048)
Republican votes	.00003 (0.0002)	−.0352** (0.0121)	−.0389** (0.0071)
Occupational hazards			
Construction	.0006 (0.0007)	−.0807 (0.0545)	−.1044** (0.0313)
Manufacturing	.0013** (0.0004)	.0088 (0.0314)	−.0608** (0.0166)
Wholesale trade	.0005 (0.0014)	−.0913 (0.1048)	−.0900 (0.0620)
Retail trade	.0022** (0.0007)	.0403 (0.0521)	−.0831* (0.0301)
Transportation	.0035** (0.0008)	.1634** (0.0618)	−.0478 (0.0362)
Information	.0004 (0.0021)	−.0021 (0.1556)	−.0711 (0.0927)
Finance	.0015 (0.0010)	.1487* (0.0725)	.0611 (0.0428)
Professional	.0022* (0.0008)	.1250* (0.0627)	.0183 (0.0360)
Edu and healthcare	.0011* (0.0005)	.0684 (0.0399)	.0193 (0.0221)
Arts	.0007 (0.0006)	.0440 (0.0476)	.0040 (0.0262)
Other occupation	.0020 (0.0012)	.1179 (0.0934)	−.0008 (0.0553)
Public admin	.0034*** (0.0005)	.1541** (0.0440)	−.0769* (0.0235)
Environmental hazards			
Water violations	−.0004 (0.0026)	.0529 (0.1971)	.1348 (0.1188)
Health behaviors			
Health behaviors	.0007 (0.0009)	−.0371 (0.0698)	−.0975* (0.0420)
Neighborhood safety			
Violent crime	−.00003** (0.00001)	−.0035*** (0.0005)	−.0015** (0.0003)
Severe housing problems	−.0013* (0.0005)	−.0406 (0.0416)	.0850** (0.0244)
n	792	792	870
*r*²	.18	.38	.58

***p < .0001. **p < .01. *p < .05.
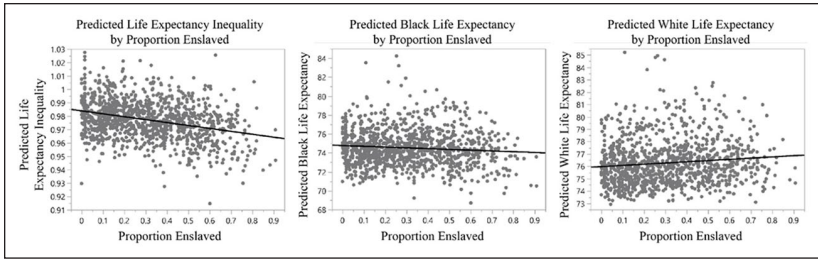
Figure 4. Scatterplots of predicted life expectancy by proportion enslaved.

a 1.72 year decrease in black life expectancy. This supports my second hypothesis and suggests that living in a county with stronger ties to slavery may shorten the life expectancies of black people in former slave states.

The final column shows estimates for white life expectancy. Proportion enslaved is positive and significant. That means that on average slave state counties that had higher proportions of enslaved people have higher white life expectancy between 2016 and 2018, a relationship that is robust to my control variables. The coefficient is roughly 1.81, which means holding other factors constant a .1 increase in the proportion of slaves in a county accounts for a 1.81 year increase in white life expectancy. This supports my third hypothesis and suggests that the legacy of slavery may function to lengthen the life expectancies of white people in former slave states.

In combination these results suggest that the legacy of slavery functions to increase life expectancy inequality by both extending the life expectancies of white people *and* shortening the life expectancies of black people.

However, I also conducted a series of supplemental analyses using model predicted values of life expectancy inequality, black life expectancy, and white life expectancy. First, the scatterplots in Figure 4 offer a better visual representation of how slavery shapes life expectancy; in particular, the positive relationship between proportion enslaved and white life expectancy becomes clearer.

Second, Figure 5 shows predicted life expectancy in quartiles. Quartiles are a valuable way to show this data because even medians can sometimes be misleading. Similar medians can mask vast differences in the distribution of the cases, which seems to be the case here. While the medians are relatively close, the distributions reveal a large gulf between black and white life expectancy.

The ends of the distribution in predicted black life expectancy compared to predicted white life expectancy show important differences. About 25% of counties have a black life expectancy of 73.3 or below, while only about
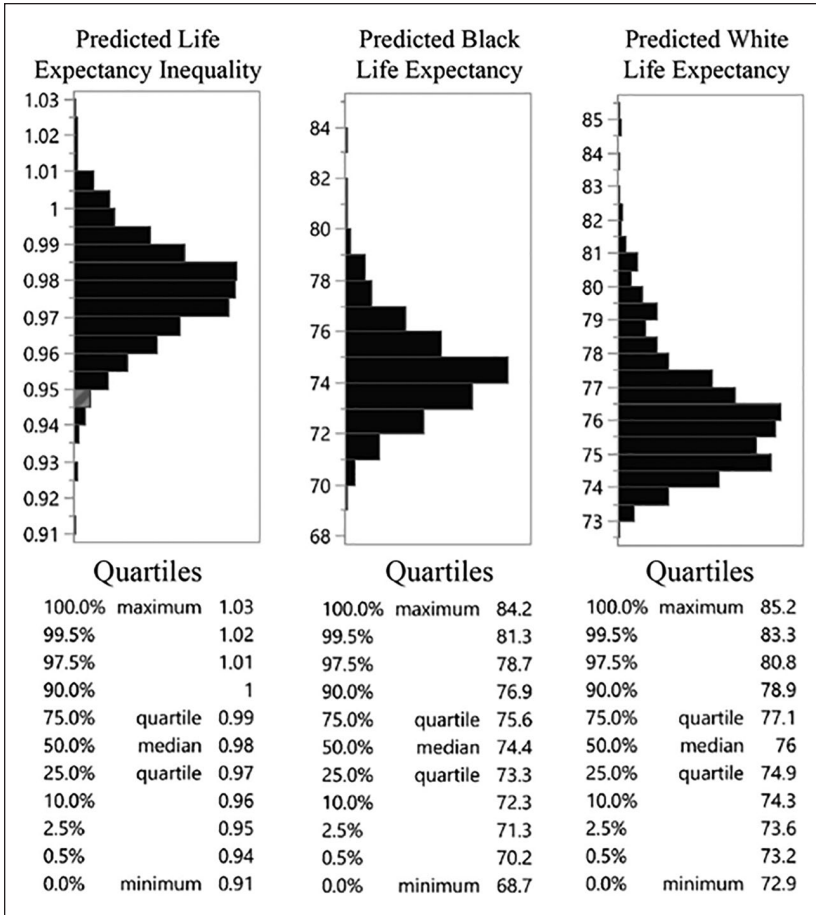
Figure 5. Histograms and quartiles of predicted life expectancy.

0.5% of counties have a white life expectancy of 73.2 or below. Conversely, only about 10% of counties have a black life expectancy of ~77 or higher, while about 25% of counties have a white life expectancy of ~77 or higher, and only about 2.5% of counties have a black life expectancy of 78.7 or higher but 10% of counties have a white life expectancy of 78.9 or higher. These disparities are also revealed in the predicted values of life expectancy inequality, which reveals only in about 10% of counties are life expectancies equal or black people have longer life expectancies. In 90% of counties white

people have longer life expectancies, with relative black life expectancies as low as 91% of white life expectancies.

Discussion and Conclusion

As the movement for reparations for chattel slavery in the United States continues to gain new strength, studies such as this one have gained increased importance. Life expectancy is the latest in a string of social, economic, and health outcomes to be linked directly to American slavery, showing how ubiquitous the impacts of slavery remain, particularly in former slave states, where the majority of black Americans still live.

This study builds on other recent research (e.g., Esenwa et al., 2018; Kramer et al., 2017; Reece, 2020) that shows not only was slavery an institution that disadvantaged and continues to disadvantage black Americans, it continues to enrich the lives of white Americans in a number of troubling ways. Reece (2020) shows slavery positively correlates with a variety of white economic outcomes and this study along with Esenwa et al. and Kramer et al. show slavery is also associated with improvements in white health outcomes. As an academic matter, this should force us to aim increased attention at slavery as a source of ongoing white power in the United States, and as a political matter, it further bolsters reparations claims. The typical arguments against reparations simply do not apply—namely that slavery was "a long time ago" and black people have had ample time to improve their social outcomes since then—if research continues to show that slavery is linked to continuous gains among white people. This work is an important reminder that slavery facilitated the unjust impoverishment of black Americans *and* the unjust enrichment of white Americans.

Moreover, it is telling that the direct effect of slavery in my regression models and those of others remains even when we attempt to control for a myriad of institutional factors, such as healthcare access, health behaviors, environmental and occupational hazards, neighborhood safety, and even other forms of racial animus. In this study in particular I reached broadly for established institutional variables that shape life expectancy. And while some of the other variables were also statistically significant, the size of the slavery coefficient dwarfed each of the other variables in every model. Slavery not only maintains a direct effect that is robust to other factors remains one of the strongest predictors of many of the outcomes we measure. The impact of slavery has not dissipated over time and continues to outshine other, more recent variables, and researchers searching for effective mediators and mechanisms have often come up empty. This underscores the uniqueness of slavery's impact on the country and our responsibility to continue to advance

research on the breadth, depth, and mechanism shaping the long-term impact of chattel slavery.

Limitations and Future Directions

Legacy of slavery research such as this generally focuses on former slave states. However, while slavery was illegal in northern states the north was also heavily embedded in the institution. Given the ongoing impact of the legacy of slavery on contemporary social and economic outcomes in former slave states it is reasonable to speculate that the north would also have localized variation in its historical attachment to the institution and that variation may be key to understanding at least some contemporary social outcomes. The challenge in examining the legacy of slavery in the north is that we cannot use the same conceptualizations we use to examine it in former slave states. The illegality of slavery in the north means that having no enslaved people in a county cannot imply a weaker connection to the institution because slavery ties in the north were not related to slave ownership. To expand legacy of slavery research in a way that speaks to its importance to the overall trajectory of the country means developing ways to examine its long-term impacts in other regions of the country. Perhaps archival research can offer ways to measure phenomena such as the percentage of raw materials produced by slave labor or the strength of abolitionist activities or stops on the Underground Railroad, each of which speak to a specific way northern counties may have been embedded in slavery and may provide us a way to examine the legacy of slavery outside of the South. This a long-term project that requires effort and dedication since it lacks the readily available data we use to investigate the legacy of slavery in the South, but if we are to maximize the potential of this research it is incumbent upon us to embark on this journey.

Moreover, while legacy of slavery scholars have dedicated considerable resources to linking slavery to contemporary outcomes we have neglected to engage in a thorough investigation of historical mechanisms and, relatedly, have generally neglected to connect slavery to other historical phenomena, particularly those that already have a robust social scientific literature like lynching. At this stage in the trajectory of legacy of slavery research it is no longer adequate to simply establish links. We must begin to empirically investigate the whys and try to understand the complex interactions involved with over a century and a half of history. Similar to investigating the legacy of slavery in the north this is not easy. These are methodologically complex projects, but they are vital to our cumulative understanding of the impact of slavery on the United States.

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