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Innocence Mortality Tax: The Impact of Wrongful Conviction on Lifespan

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Résumé de l'article

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Innocence Mortality Tax: The Impact of Wrongful Conviction on Lifespan

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The wrongful conviction of innocent individuals is a growing problem for those unjustly convicted and the integrity of the American legal system, with exonerees often struggling post-exoneration. Yet, too little is known about the long-term impact of wrongful convictions on those unjustly convicted. Thus, we investigated the effect of wrongful conviction on mortality and lifespan—that is, we tested for the possibility of an “innocence mortality tax.” We found that more exonerees have died than expected when compared to U.S. death rates, and that exonerees died 13.24 years earlier than would be expected given their age, gender, race/ethnicity, and incarceration length. Notably, those exonerees whose cases involved a false confession or mistaken eyewitness identification died significantly sooner than their counterparts whose cases did not involve such factors. Our results highlight the need for researchers, practitioners, and policymakers to continue to find ways to mitigate the harm done to innocent individuals unjustly convicted.

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I Introduction

The advent of DNA evidence into the criminal legal system in the 1980s introduced an improved mechanism to sort the guilty from the innocent. To date, DNA evidence has been used

to exonerate nearly 570 wrongly convicted individuals, but perhaps even more importantly it has helped to shine a light on the failings of the United States' criminal legal system. Since 1989, over 2,700 individuals have been exonerated *without* exculpatory DNA evidence, most often for serious crimes like murder and rape (National Registry of Exonerations [NRE], 2023). However, many scholars opine that the number exonerated to date grossly underestimates the true number of wrongly convicted, and that there are many innocent individuals languishing in prison that the system has not yet identified (see Zalman & Norris, 2021 for an overview of the “dark figure” of innocence). Indeed, as our understanding of wrongful convictions continues to grow, so too does the number of annual exonerations (see online: <https://www.law.umich.edu/special/exoneration/Pages/Exoneration-by-Year.aspx>).

The scholarship of wrongful convictions has advanced significantly in the past 30 years (see Norris et al., 2020). While there has been much written and researched on the contributing factors of wrongful conviction, such as false confessions (Kassin et al., 2010) and eyewitness misidentification (Wells et al., 2020), less scholarship has focused on what happens post-exoneration. As stated by Norris et al. (2020), “[r]esearchers have yet to examine many additional harms associated with justice system errors” (p. 39); that is, the aftermath of wrongful convictions. In the present research, we examine what may perhaps be the ultimate consequence: the effect of wrongful conviction on one’s lifespan, which to our knowledge, is a question not yet addressed in the scholarship. More specifically, we ask whether being wrongly convicted influences life expectancy itself, or alternatively put, whether there is an innocence mortality tax associated with wrongful conviction. If so, what are possible factors that may explain such a relationship? To address these issues, we access and analyze data from the National Registry of Exonerations (NRE) and the Centers for Disease Control and Prevention (CDC). After briefly reviewing research on life expectancy, we then describe relations between wrongful convictions and health outcomes and the potentially unique impacts for those wrongly imprisoned.

A. Life Expectancy

With the exception of the recent pandemic, the United States life expectancy—a common measure of population health (Andrasfay & Goldman, 2021)—has experienced steady increases over the past 60 years (Woolf & Schoomaker, 2019). Researchers, however, have long known that not every group has the same life expectancy at birth (e.g., Antonovsky, 1967). For example, Black and Hispanic Americans are known to have shorter lifespans than White Americans, a pattern that has worsened with the pandemic (Woolf & Schoomaker, 2019).

Another group of individuals that has historically experienced reduced life expectancy is incarcerated individuals (see Massoglia & Pridemore, 2015 for an overview). As the overwhelming majority of known exonerees did spend time in prison (up to 47 years), disentangling the effects of incarceration from the possible effects of wrongful conviction on lifespan is an important consideration. The shortened lifespan of those incarcerated is likely due to the negative health sequelae associated with serving custodial sentences, such as chronic health concerns (Schnittker & John, 2007), infectious diseases (e.g., hepatitis; Massoglia, 2008b), lower self-reported health overall (Massoglia, 2008a), and increased body mass index (BMI; Houle, 2014). Several mechanisms have been proposed to explain the association between incarceration and poor health outcomes: incarceration increases exposure to diseases; incarceration itself is a

stressor, which can in turn increase inmates' vulnerability to mental and physical illness; and incarceration impedes life after release, making it difficult to recover from any illness obtained or exacerbated by incarceration (Massoglia & Pridemore, 2015). Regardless of how incarceration impacts health, the situation is made worse by the poor healthcare offered to inmates. In fact, it was not until 1976 that healthcare was even guaranteed to inmates by the Supreme Court of the United States (*Estelle vs. Gamble*, 1976). Even with this ruling, scholars have argued that healthcare offered to inmates is often insufficient (Nowotny, 2017) and in conflict with inmates' needs (Allen et al., 2010). Not surprisingly, these changes in health status impact life expectancy for incarcerated individuals.

Generally, research on incarceration and mortality has focused on (1) the increased risk of death for incarcerated individuals compared to non-incarcerated individuals (e.g., Patterson, 2013; Spaulding et al., 2011) and (2) the cause of death (e.g., Harzke et al., 2011; Mumola, 2007). For the most part, this research has focused on the short-term, particularly the threat to inmates' health immediately following release (e.g., Farrell & Marsden, 2008). However, studies with longer follow-up periods continue to find that people who experienced incarceration have higher mortality rates than residents of the same state (Rosen et al., 2008).

These increased mortality rates associated with incarceration are connected to a reduction in life expectancy. By studying data from a cohort of New York parolees, most of whom had served less than two years incarcerated, Patterson (2013) found that each year of incarceration reduced life expectancy by two years. However, this impact on life expectancy decreased over time and parolees could "recover" their lost years if they survived at least two-thirds of their incarceration period on parole. Looking at a more diverse sample of inmates, weighted towards long-term incarceration and with a longer follow-up observation period, Daza and colleagues (2020) determined that incarceration reduces life expectancy at age 45 by four to five years (see also, Kouyoumdjian et al., 2017). It is important to note that both Patterson (2013) and Daza et al. (2020) used estimates from the U.S. vital statistics (CDC) to offer an estimation of life expectancy reductions.

Overall, incarceration has been found to have serious consequences for inmates' health, mortality, and life expectancy. The question we ask here is whether the experience of wrongful conviction shortens lifespan, over and above the tax of incarceration itself? Specifically, as of May 2023, the NRE calculates a total of "more than 29,100 years lost" to incarceration (NRE, n.d.), but are there additional years of life lost when exonerees pass prematurely?

B. Wrongful Convictions and Health

Wrongful convictions have gained increasing attention from the public, legal actors, researchers, and policy makers (Norris, 2017). The research that has examined the aftermath of wrongful conviction has indicated that exonerees suffer materially (e.g., housing, jobs, compensation; Gutman & Sun, 2019; Kukucka et al., 2020; Zannella et al., 2020), psychologically (e.g., Grounds, 2004; Westervelt & Cook, 2012), and physically (Westervelt & Cook, 2012). Generally, those who have been wrongly convicted have been found to experience some of the same struggles as those 'rightly' convicted. However, there are also likely to be challenges unique to those wrongly convicted because of their factual innocence.

Some of the difficulties experienced by exonerees have been explained through the phenomenon known as stigma-by-association (e.g., Clow et al., 2012; Sigelman et al., 1991). Researchers have suggested that exonerees and factually guilty individuals are often perceived similarly because of the time exonerees spent incarcerated, which links innocents to factually guilty offenders (Clow & Leach, 2015). However, it is not just that exonerees suffer from similar stereotypes attached to factually guilty offenders, but that exonerees would be expected to suffer similar health consequences because of their shared incarceration experience.

Each potential mechanism that could explain why factually guilty individuals' health suffers because of incarceration applies equally—and perhaps even more so—to exonerees. First, there is no reason to expect that innocent individuals would be exposed to fewer diseases/stressors during incarceration than factually guilty individuals. In fact, exonerees have shared with interviewers that one of the reasons compensation is so important is they often need medical care to address the harms they have experienced in—or existing harms that were exacerbated by—prison (Westervelt & Cook, 2012). Self-reported data from the largest sample of exonerees to date support the claim that exonerees often suffer from physical ailments after their release (Kieckhafer et al., 2023).

Second, Massoglia and Pridemore (2015) suggest that formerly incarcerated individuals experience mortality threats and shortened lifespans because their criminal history makes it difficult, if not impossible, to recover from the stress and harm of incarceration. Evidence indicates exonerees suffer stigma comparable to factually guilty individuals (Clow & Leach, 2015). For example, exonerees often struggle to find housing (Kukucka et al., 2021; Zannella et al., 2020), employment (Kukucka et al., 2019), or support for other reintegration services (Scherr et al., 2018a; Scherr et al., 2018b; Scherr et al., 2020a). Further, unlike factually guilty individuals, exonerees often do not have access to traditional reintegration services available to parolees. In fact, an audit study of mental health professionals suggests that exonerees were the most likely to be ignored when making inquiries in comparison to parolees and former first responders (Reyes-Fuentes et al., 2023).

Third, if the stress of incarceration is a mechanism through which individuals' mortality becomes at risk and life expectancy is decreased (Massoglia & Pridemore, 2015), then exonerees may be at greater risk than factually guilty individuals. Interviews with exonerees have suggested that the toll of maintaining, or hiding, their innocence while incarcerated could lead to exonerees experiencing greater carceral stress than their factually guilty counterparts (i.e., a "social and psychological burden") (Umamaheswar, 2022a, p. 8). This comparatively higher level of carceral stress relative to factually guilty individuals may be especially true for minority exonerees (Umamaheswar, 2022b). In fact, self-reported data from exonerees suggest that the majority (80%) experience at least one traumatic event while incarcerated and that roughly half of exonerees meet the clinical criteria for post-traumatic stress disorder ("PTSD") and/or depression (Kukucka et al., 2022). Comparatively, a review of the literature on PTSD in sentenced prison populations found rates of PTSD symptoms ranging from 4-21% (Goff et al., 2007). Thus, like factually guilty individuals, it seems likely that exonerees' mortality and lifespan could be impacted by their time wrongfully incarcerated and the stress of incarceration. Unlike factually guilty individuals, however, *how* exonerees end up wrongfully convicted could introduce factors unique to their experience that impacts their health.

To explore the potential impact of factors unique to wrongful conviction to impact mortality and lifespan, we include compensation and case characteristics in our analyses. One such case characteristic is false confession. A recent, novel framework has suggested that the consequences of a wrongful conviction are especially pernicious for false confessors. Specifically, the Cumulative Disadvantage Framework (“CDF”) (Scherr et al., 2020b) demonstrates that false confessors experience a series of negative outcomes stemming from a false confession, even post-conviction and post-exoneration. For example, false confessors have been found to be perceived as more responsible for their wrongful conviction, as less likely to be innocent, and less deserving of financial and other compensation (Kukucka & Evelo, 2019; Scherr et al., 2020a) than those who did not falsely confess.

Another possible factor that may relate to a reduced mortality is whether exonerees received compensation for the wrongful conviction. To date, approximately 42% of exonerees have received compensation (Gutman & Sun, 2019), which facilitates financial stability. This in turn increases housing stability and access to health care, and ultimately may help to alleviate Massoglia and Pridemore’s (2015) concern about the inability to recover from the stigma of incarceration. Furthermore, research has suggested that receiving significant compensation reduces the likelihood that exonerees will engage in criminal activity (Mandery et al., 2013), which reduces the chance of a violent death and further incarcerations (Lim et al., 2012).

II The Present Study

Because of their shared incarceration experience, there is reason to believe that exonerees may experience lower life expectancies and reduced lifespans like their factually guilty counterparts. What remains unclear, however, is whether the factors unique to the experiences of exonerees might increase the risk to their lifespan. Therefore, we examined (a) whether exonerees were dying at similar rates to that of the general population sharing certain demographic characteristics; (b) whether a sample of exonerated individuals who had passed either failed to achieve, met, or exceeded their established life expectancy; and (c) what factors might predict exonerees’ lifespans. We hypothesized the existence of an “innocence mortality tax”: a gap in lifespan and life expectancy for exonerees over and above the deleterious effect of incarceration.

We also investigated how efforts to obtain compensation and contributing factors to wrongful conviction influence exonerees’ lifespans. The extant scholarship of wrongful conviction has identified six canonical contributors of wrongful conviction. These include false confession (typically when an innocent suspect is coerced into confessing to police; see Kassin et al., 2010), eyewitness misidentification (when a witness mistakenly identifies the wrong perpetrator; see Wells et al., 2020), official misconduct (when legal actors abuse their authority in such a way that their actions contribute to the wrongful conviction; see Drummond & Mills, 2020), perjury or false accusation (when an individual other than the exoneree offers false incriminating testimony under oath or offers false information that would be considered perjury if given under oath; see Hail-Jares et al., 2020), false or misleading forensic evidence (when an individual is convicted in part because of forensic evidence that resulted from error or fraud, was the product of unreliable or unproven methods, or was present with exaggerated confidence; see Cole et al., 2022), and inadequate legal defense (when, at trial, a defense lawyer offers “obviously and grossly inadequate

representation”; NRE, n.d.; e.g., Greenbaum, 2019). Given the abundant scholarship that false confessors are uniquely disadvantaged and suffer additional consequences relative to non-false-confessors (Scherr et al., 2020b), we expected an increased loss of life among false confessors. We do not make *a priori* hypotheses about the remaining five factors, though we examine relations with exoneree lifespan.

III Method

To answer our research questions, we needed to create two measures, the *standardized mortality ratio* and *life expectancy* (see below). The first step was to identify exonerees who have passed. We identified the exonerees who passed ($n = 186$) as of June 2022 by having two independent coders review detailed case information in the NRE. Specifically, each reviewer went through all 2,657 case summaries available as of June 2022 for any information regarding the exoneree’s current status. If the case summary provided information about the exoneree’s passing in addition to the year and cause of death, that information was recorded. If it was unclear if the exoneree was still living or other information regarding their passing was missing, the coders conducted internet searches, using phrases such as “[EXONEREE NAME] exoneree obituary”, to supplement information. Coders went through the first two pages of each search. Disagreements were resolved via discussion, though the first author made all final decisions.

Once the sub-sample of passed exonerees were identified, we calculated the *standardized mortality ratio* using U.S. death rates. This ratio determined if exonerees’ mortality risk was higher than that of the average population. Next was to calculate *life expectancy* (and *adjusted life expectancy*; see below), which represented the difference between exonerees’ lifespan and estimates of exonerees’ remaining years (given their age, gender, and race/ethnicity) at the point of their wrongful conviction.

A. Standardized Mortality Ratio

Using the U.S. vital statistics, published by the Centers for Disease Control and Prevention (CDC, 2019), we identified the death rate for several groups of individuals. These groups were identified based on their race, sex, and (categorical) age at death. Using these death rate estimates from the general population, we calculated how many exonerees in each corresponding group would be expected to pass in our sample. For example, if the U.S. death rate for Black men aged 30-35 years is 1,000/100,000 individuals, and our sample of exonerees included 100 Black men aged 30-35 years either at the time of their death or as of 2022 (i.e., the point of censorship), we would expect that 1 man in our sample would have passed. We then took the ratio of observed deaths relative to the expected deaths (i.e., the mortality ratio), standardized the calculated value, and applied a statistical test using a chi-square distribution. By calculating a *standardized mortality ratio* using the full sample of known exonerees, we can be assured that results stemming from the

sample of passed exonerees only were not capitalizing on a statistical anomaly. The sample of living exonerees served as a comparison group for death rates.

B. Life Expectancy

Obtained lifespan for passed exonerees was calculated by subtracting year of birth from year of death. Using the U.S. vital statistics, life expectancy was obtained using the exoneree's gender, race, age at conviction, and year of wrongful conviction (CDC, 2019). Specifically, using the CDC (2019) Life Expectancy tables, exonerees' estimated life remaining at the point of their wrongful conviction was determined and then added to their age at conviction for their total *life expectancy*. For example, a White woman who was 59 in 1989 could expect to live another 23.09 years according to the CDC (2019). Thus, at the time of her wrongful conviction in 1989, this woman could expect to live to 82.09 years old (i.e., the 59 years she had already obtained added to the 23.09 years remaining). Because the CDC (2019) estimates life remaining using ranges of years that are not continuous (e.g., 1989-1991 and 1999-2001, with no estimates for the years between 1991 and 1999), exonerees' year of conviction could fall in an unrepresented year. In those cases, the range closest to the year of conviction was used. If two ranges were equidistant from the exoneree's year of conviction, the more conservative range was used to estimate life remaining (i.e., in the previous example, the more conservative range would be 1989-1991). By using the older estimates, we decreased the estimation for years remaining, which artificially lowered exonerees' life expectancy, making it more difficult to demonstrate a difference when compared to obtained lifespan, and thus a more conservative estimate.

Estimated years remaining were not readily available for the Native American ($n = 2$) or Hispanic/Latinx exonerees in our sample ($n = 16$). To estimate life expectancy for Native American exonerees, information from the U.S. Department of Health and Human Services Office of Minority Health (n.d.) was used, indicating that Native Americans' life expectancy was most similar to estimates collapsed over all races and genders. Specifically, the average life expectancy for each possible combination of race and gender (e.g., average of all men, average of Black men, average of White individuals, etc.) was calculated using the CDC (2019) information and compared to the life expectancy estimate provided by the Office of Minority Health (n.d.). The CDC (2019) average that was closest in value to the Minority Health (n.d.) estimate was retained. Thus, for the two Native American exonerees, the life expectancy estimate was obtained from the average life expectancy, collapsed across race and gender, in the appropriate year. Next, the CDC (2019) provides life expectancy information for Hispanic/Latinx individuals starting from 2006, but none of the passed Hispanic/Latinx exonerees were convicted in 2006 or later. Rather, the most recent conviction for this subsample was in 1998 (NRE, 2022). The 11-year CDC (2019) observation period for Hispanic/Latinx individuals was compared to the same observation period for all other CDC (2019) categories using the same approach employed with the Native American sample. This comparison indicated that Hispanic/Latinx life expectancy estimates were most similar to the life expectancy of White individuals regardless of gender. Thus, estimates for the 16 Hispanic/Latinx exonerees were taken from White individuals collapsed across gender in the years corresponding to their wrongful conviction.

Once life expectancies were calculated, a new variable, *adjusted life expectancy*, was calculated to account for the deleterious impact of incarceration on life expectancy. Daza and

colleagues (2020) found that incarcerated individuals experienced a four- to five-year reduction in life expectancy. By adjusting exonerees' life expectancy by five years, as opposed to four, we created a lower adjusted estimate of life expectancy by subtracting a higher value. As a result, it was more difficult to find a difference between the lower life expectancy estimates and exonerees' lifespan. Thus, we used the more conservative estimates and adjusted the CDC estimates by five years for all exonerees. In a separate series of analyses, the incarceration adjustment was calculated using both Patterson's (2013) and Daza's et al. (2020) estimates of the impact of incarceration on life expectancy. Results did not change substantively, so we present analyses using the latter's estimates because the vast majority (95%) of our exoneree sample spent significantly more time incarcerated than the sample used in Patterson's (2013) study.

Both estimates for life expectancy (i.e., adjusting for incarceration or not) were then statistically compared to exonerees' obtained lifespan using paired *t*-tests. By using an ideal measure of life expectancy based on each exoneree's race, gender, and age at wrongful conviction, the adjusted and unadjusted estimates of life expectancy served as a matched comparison. Thus, we had two comparison groups: (a) the standardized mortality ratio used the full sample of living exonerees as a statistical comparison for the rate of death among exonerees; and (b) the CDC estimates served as a statistical, matched comparison for the loss of life among passed exonerees.

IV Results

We identified 186 exonerees who have passed as of June 2022. Passed exonerees (94% male) were 30.99 ($SD = 11.09$) years old when wrongfully convicted and spent an average of 13.49 years ($SD = 9.36$) incarcerated. The majority were racial and/or ethnic minorities (57%). Passed exonerees were 53.76 years old ($SD = 13.23$) at their death and lived an average 9.28 years ($SD = 8.90$) post-incarceration. Similar to the population of known exonerations in the NRE, leading contributors to the wrongful conviction for the past sample were perjury/false accusation (60%; compared to 63%) and/or official misconduct (62%; compared to 59%). Furthermore, 17% of cases included false confessions (compared to 12%) and 39% included eyewitness misidentification (compared to 27%).

A. Standardized Mortality Ratio

First, we examined the *standardized mortality ratio*, which compared the number of observed deaths in our sample to the number of deaths that would be expected based on population death rates. We found that among exonerees (i.e., those living and passed; $n = 2,657$), a standardized mortality ratio indicated that significantly more exonerees had passed than would be anticipated based on U.S. death rates, $\chi^2(1) = 738.18$, $p < .05$. The expected number of deaths in our full exoneree sample was 32 but we identified 186 exonerees who passed. Thus, our standardized mortality ratio was 5.81 (186 observed deaths: 32 expected deaths). With evidence that almost six times as many exonerees are dying than expected, we turn our focus to those exonerees who passed.

B. Lifespan Expectancy

Analyses indicated that passed exonerees died 18.24 years ($SD = 13.61$) earlier than would be expected given their age, race, and gender. Passed exonerees were expected to live to 72.00 years old ($SD = 4.77$), but only lived to 53.76 years old ($SD = 13.23$); $t(185) = 18.28$, $p < .001$, $d = 1.83$, 95% CI of d [1.56, 2.10]. Even after accounting for years incarcerated (i.e., the *adjusted life expectancy*), passed exonerees died 13.24 years ($SD = 13.61$) earlier than the expected 67.00 years ($SD = 4.77$), $t(185) = 13.27$, $p < .001$, $d = 1.33$, 95% CI of d [1.09, 1.57].

A multiple ordinary least squares regression was conducted to investigate whether the six factors commonly identified as leading to wrongful conviction and compensation predicted exoneree lifespan. The overall model was significant, $F(11,172) = 4.63$, $p < .001$, explaining about 23% of the variance in lifespan. Results (Table 1) indicated that White exonerees lived longer than their counterparts. However, those whose cases involved a false confession or mistaken eyewitness identification died 6.09 and 5.46 years earlier than their counterparts, respectively. There was also a small, counterintuitive effect of incarceration, such that for every additional year of incarceration, exonerees lived 0.48 years longer.

Table 1. Predicting exonerees' age at death controlling for time incarcerated, race, and gender.

	<i>B</i>	<i>SE(b)</i>	β	<i>p</i> -value
Years Incarcerated	0.48	0.11	.34	< .001
Race	-4.63	1.87	-.18	.014
Gender	6.40	3.86	.12	.099
Filed for Compensation	0.56	2.42	.02	.817
Granted Compensation	0.57	2.42	.02	.834
False Confession	-6.09	2.58	-.17	.019
Mistaken Eyewitness Identification	-5.46	2.19	-.20	.013
Official Misconduct	4.05	2.14	.15	.060
False or Misleading Forensic Evidence	0.96	2.21	.03	.665
Perjury or False Accusation	-2.87	2.30	-.11	.214
Inadequate Legal Defense	-1.21	2.54	-.04	.635

Notes. Race was coded as White (0) and non-White (1). Gender was coded as male (0) and female (1). All other variables are dummy coded to examine the presence (1) or absence (0) of each factor.

V Discussion

The observed effects illustrate the traumatic and enduring influence that wrongful convictions can have on individuals. Specifically, we found 186 exonerees who had passed, a number almost six times greater than would be expected based on U.S. death rates. Not only did we find evidence that exonerees are experiencing a risk to their mortality, we also found that exonerees passed, on average, more than 18 years earlier than would be expected given their age, gender, and race. Even accounting for the tax of incarceration, exonerees died more than 13 years sooner than would be expected. Thus, not only are more exonerees passing than would be expected compared to the general population, but they are dying sooner than their general population

counterparts. Our investigation suggests that non-White exonerees, exonerees whose cases involved a false confession, and exonerees whose case involved a mistaken eyewitness identification experience significantly shorter lifespans than their counterparts. Unexpectedly, we found a small positive impact of incarceration such that each additional year of incarceration increased lifespan by half a year. No other predictors (e.g., compensation, gender, other case variables) were statistically significant.

A. Theoretical and Applied Implications

Research consistently demonstrates that exonerees (i.e., innocent individuals who were wrongly convicted and later exonerated) suffer severe psychological consequences, physical pains, and post-exoneration struggles (e.g., Grounds, 2004; Westervelt & Cook, 2012), regardless of having received financial compensation. Our results lend support to this idea as neither the decision to pursue compensation or being awarded compensation had a significant effect on exonerees' lifespans. To be clear, there is a normative value to compensating the wrongfully convicted as well as the practical—and potentially psychological—benefit of financial compensation. It is possible that we did not find an impact of compensation on lifespan because of the way we dichotomized the variable (i.e., yes/no received compensation), a reflection of the limited information available about specific compensation amounts. Possibly, compensation could have a threshold effect. That is, for example, compensation below a specific amount may have no appreciable impact on lifespan, but once that threshold is met we would see a positive benefit to exonerees' health as the disposable income necessary for a healthier lifestyle is met. Previous research has found this type of threshold effect: Exonerees compensated less than \$500,000 were significantly more likely to criminally offend post-release compared to exonerees compensated over \$500,000 (Mandery et al., 2013). Future research should continue to investigate the very real impacts compensation may have on exonerees mortality and lifespan.

Overall, our results suggest that exonerees' post-exoneration struggles and victimization by the state (Westervelt & Cook, 2010) takes an innocence mortality tax. The concept of an innocence mortality tax is novel to the literature that has conceptualized harm to exonerees in terms of stigma (Clow & Leach, 2015), physical harm (Westervelt & Cook, 2010), mental health (Grounds, 2004), and inadequate resources post-release (Gutman & Sun, 2019; Scherr et al., 2018a; Scherr et al., 2020a). Perhaps it is not unexpected, however, given the documented detriments of a wrongful conviction which can linger post-exoneration.

Our results also support the Cumulative Disadvantage Framework (CDF), which demonstrates that false confessors are perceived as more responsible for their wrongful conviction, less likely to be innocent, and less deserving of financial and other compensation (Scherr et al., 2020b). The significant reduction in life expectancy found here for false confessors could be the ultimate culmination of the disadvantages laid out in the framework. It is unclear, however, why exonerees whose cases involved a mistaken eyewitness identification were also likely to pass sooner than exonerees whose cases did not involve a mistaken eyewitness identification. Like false confessions, mistaken eyewitness identifications are more likely to happen earlier in the criminal legal process in comparison to contributors like official misconduct and inadequate legal defense, so perhaps there is more time for the negative impacts of a mistaken eyewitness identification to

take effect (i.e., cumulative effects). Regardless, to some extent, the criminal legal system has the ability to minimize both false confessions and mistaken eyewitness identifications.

To that end, we echo calls to increase the transparency of criminal legal investigation and adjudication procedures. For example, scientific consensus papers on eyewitness misidentifications (Wells et al., 2020) and on police interrogations and confessions (Kassin et al., 2010) are clear that electronically recording eyewitness identification procedures and interrogations from start to finish is key to help prevent wrongful convictions. However, as of 2019, only eight states required recording eyewitness identification procedures; and, whereas 25 states require recording interrogations, most require this under certain circumstances (e.g., homicides or other violent crimes, or for juveniles only; Norris et al., 2019).

Our findings also revealed that non-White exonerees passed sooner than their White counterparts. The disparity in lifespan adds to the larger literature that has historically demonstrated racial and ethnic gaps in life expectancy at birth (e.g., Antonovsky, 1967) and specifically to research that suggest wrongful convictions represent a cumulative racialized experience (Umamaheswar, 2022b). Unfortunately, as the full impacts of COVID-19 are felt, we might expect the disparity among exonerees to grow given the wider impact of the pandemic on racial disparities (Woolf & Schoomaker, 2019). We ended our data collection in the middle of the pandemic, and as such only identified two exonerees who passed due to complications related to COVID-19 and are unable to speak to this possibility.

Perhaps related to the impacts of race/ethnicity, we also found that the number of years incarcerated was positively related to lifespan. Specifically, some researchers have suggested that incarceration can serve as a protective factor for the health of, in particular, young, Black men. The argument is that incarceration provides more regular access to food and medical care, and less exposure to gun violence, than young, Black men might experience in their neighborhoods (see Massoglia & Remster, 2019). Research on the relationship between morality and incarceration has also found that the association is stronger for women than men. Perhaps the over-representation of young, Black men—and men more generally—among the sample of exonerees could partially explain the counterintuitive finding that incarceration was associated with longer lifespans (by half a year). While we did not have the sample size to allow for the exploration of interaction effects, future research should examine the potential for race and/or gender to interact with years incarcerated when explaining lifespan.

B. Limitations and Conclusions

Our results suggest that wrongful convictions might result not just in years lost to incarceration but to lost years of life. Of course, being the first study—to our knowledge—to examine empirically the physical toll of wrongful convictions on lifespan, there are some limitations to make known. First, our regression analysis was limited to the variables we could access. However, there are several factors we could not access that could influence lifespan. For example, whether exonerees have stable housing or access to medical care could impact life expectancy. Second, future researchers should consider a more direct comparison of exonerees to factually guilty individuals, ideally with matched samples or using propensity score matching techniques.

The observed effects illustrate the traumatic and enduring influence that being a victim of wrongful conviction has on individuals. More exonerees have passed than would be expected given population estimates, and even accounting for an incarceration tax, exonerees died sooner than would be expected. Taken together, the results of this study emphasize the need to address the harm done by wrongful convictions. Specifically, the results of this study demonstrate that exonerees are losing years off their lives, even beyond what incarceration can explain, necessitating work to mitigate the innocence mortality toll. These results have implications for how the cost of wrongful conviction is conceptualized and policy recommendations aimed at mitigating these costs.

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