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Inequalities in Opioid Prescribing and Mortality in California: A Test of Fundamental Cause Theory

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Shayna M. La Scala

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Thesis Committee:
Dr. Bruce G. Link, Chairperson
Dr. Tanya Nieri
Dr. Kalina Michalska

The Thesis of Shayna M. La Scala is approved:

Committee Chairperson

University of California, Riverside

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Dedication

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ABSTRACT OF THE THESIS

Inequalities in Opioid Prescribing and Mortality in California:
A Test of Fundamental Cause Theory

by

Shayna La Scala

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Dr. Bruce G. Link, Chairperson

A critical problem facing the health of the U.S. is the opioid epidemic which has been unfairly addressed due to racism and the divide of color. Prescription opioid use has seemingly affected different demographics at different periods and rates, with growing racial disparities. Much evidence suggests a discrepancy in the government and public response to this drug epidemic in comparison to the criminalization of the drug epidemic of the 1980s, having to do with the race/ethnicity of a person using drugs, with communities of color facing incarceration and Whites facing recovery services. A strong theoretical tradition in medical sociology says that health outcomes are built on social factors, specifically racialized social systems that reinforce white privilege through social relations and practices. Data from the State of California (CA), over much of the period of the epidemic (2008-2018), was used to test whether this happened for opioid prescriptions and deaths in CA counties(n=58). To investigate some of the dynamics of this growing problem, I formulate and empirically test hypotheses derived from fundamental cause theory (FCT) as a contributing explanation for opioid prescription and overdose (OD) death trends in California. This theory proposes that disparities by

socioeconomic status (SES) and race-ethnicity persist or are reproduced because access to treatments and interventions are unequally distributed, flowing more freely to those with greater access to flexible resources of knowledge, money, power, prestige, and beneficial social connections. Multiple regression was run to investigate the extent to which counties that were predominately populated by Whites, had greater access to opioid prescription over time. An investigation of OD death trends in CA counties over time was also investigated. Results were consistent with FCT, involving resources that determined the extent to which whites were able to avoid multiple disease outcomes involving the opioid epidemic.

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Inequalities in Opioid Prescribing and Mortality in California: A Test of Fundamental Cause Theory

A critical problem facing the health of the U.S. is the opioid epidemic which has been unfairly addressed due to racism and the divide of color. Prescription opioid use has seemingly affected different demographics at different periods and rates, with growing racial disparities. Much evidence suggests a discrepancy in the government and public response to this drug epidemic in comparison to the criminalization of the drug epidemic of the 1980s, having to do with the race/ethnicity of a person using drugs (Alexander 2020; Cooper 2015; Drake et al. 2020a; Nellis 2021), with communities of color facing incarceration and Whites facing recovery services. A strong theoretical tradition in medical sociology says that health outcomes are built on social factors, specifically racialized social systems that reinforce white privilege through social relations and practices (Bonilla-Silva 2022; Link and Phelan 1995; Phelan and Link 2015). This study is an investigation of racial trends of accessibility to opioid prescriptions and overdose deaths (OD deaths) over time in California(CA) counties.

The epidemic has shifted amongst White non-Latinx populations to the point where this group no longer has the leading overdose death rate that this population once succumbed to. This thesis sets out to determine whether and to what extent the racial patterning of opioid prescriptions and overdose shifted as their use changed from being considered a health benefit to a health harm and how counties control the social determinants contributing to adverse health effects for their populations. Counties reserve a substantial amount of power in their budget allocation and spending, without much

interference from the state. In 2011 CA underwent a “realignment” where the CA correctional system underwent a substantial change with assembly bill 109(AB 109), which shifted the responsibility for thousands of imprisoned individuals from the state to counties. The change came with $4.4 billion allocated to counties during the years 2016-2017 (Petersilia and Snyder 2013), with legislation directing counties to utilize these funds on community-based programming that focused on rehabilitation to subdue the effects of recidivism. Although some CA counties followed suit with the expansion of social services focusing on treatment, other counties doubled down on enforcement. One study was used to examine spending patterns in CA counties and analysis typifies that counties that allocated AB 109 funds to enforcement, were responding to criminal justice needs that include a historic preference for using prison to punish drug offenders (Lin and Petersilia 2014). While other counties that focused on the allocation of funding to treatment showed under-funding in district attorneys and probation departments. These county-level effects are mechanisms that perpetuate inequities for communities of color.

For example, in places where more minoritized individuals predominately reside, such as Los Angeles County and Riverside County, 50-75% of AB109 funds were spent on Sheriffs and Law Enforcement. While counties along the northern coast spent 0-50% of their budget on Law Enforcement (Lin and Petersilia 2014). On the other hand, counties such as Fresno and Tulare have a large migrant and immigrant farm working community and spent 0-25% of AB 109 funds on programs and services. These counties are part of the Central Valley, consisting of 19 counties, 6 of which are the poorest in CA (Murray-García et al. 2022).

The distribution of resources at this level can be racially discriminatory in which counties that have larger white populations retain more resources that make it easier to respond to threats such as addiction, or rehabilitation after incarceration. Investigating social determinants of health that contribute to county-level inequities makes the county a crucial unit of analysis to understanding the trends of mortality in opioid ODs as exemplified by the county spending patterns on punitive vs. social service programs.

One theory that investigates the social determinants of health is the fundamental social causes theory (FCT) which claims that the fruits of health-beneficial circumstances are more likely to be taken up and the hazards of health-harmful circumstances more likely to be avoided by individuals and groups propitiously situated in socioeconomic and racial hierarchies. I use data from the State of CA, over much of the period of the epidemic (2008-2018), to test whether this happened for opioid prescriptions and deaths in CA counties (n=58). The issue is rooted in the overdose epidemic and consequently I begin the development of the research problem there.

Record high overdoses occurred in the United States (US) with over 90,000 OD deaths in 2020 and 60% of them due to the use of synthetic opioids. The spike in deaths co-occurred with the federal COVID-19 related stay at home orders for COVID mitigation issued in March 2020 and stayed elevated through the year, at an all-time high since 1999 (CDC 2021b). With this elevation, racial patterns of OD deaths have begun to shift exposing the intersectional vulnerabilities of certain social groups. Its estimated that there was a 40-46% increase in overdose deaths in California, amongst the highest in the nation, with a higher proportional increase in these experiences for younger males in communities

of color compared to 2019, with the gap of white non-Latinx and Black OD death rates nearly disappearing (CDC 2021b).

Opioids are highly sought, addictive narcotics that induce euphoric positive reinforcements to one's brain. The abrupt discontinuation of chronic use can result in dysphoria or death (Kolodny et al. 2015). Despite harm reduction resources, troubling trends of overdose deaths have continued to unfold over the two decades: between the years of 2000 and 2014, there was a 200 percent increase in overdose deaths from opioid and heroin use (Ghertner and Groves 2018; Rudd et al. 2014). This increase is directly related to Purdue Pharma's actions starting in 1996. Purdue Pharma is the largest pharmaceutical company selling OxyContin, an opioid pain medication, and sales growing from 48 million to $1.1 billion by the year 2000. To achieve this increase in sales Purdue Pharma spent $207 million on marketing prescription opioids and provided all inclusive, all-expense paid symposia for 40 National pain management and speaker trainings, for nurses, physicians and pharmacists in resorts across Florida, Arizona, and California (KHN 2018; Van Zee 2009). These healthcare worker incentives fueled a skyrocketing increase in prescription opioid use to treat chronic conditions unrelated to cancer. Prolonged patient access to prescribed opioids increased the risk of higher tolerance levels, and as a result, higher doses were prescribed for longer periods of time (Guy et al. 2017).

By November 1st, 2011, the Center for Disease Control (CDC) acknowledged that prescription painkiller overdoses had epidemic levels and were killing more Americans than heroin and cocaine combined, at the time (CDC 2011; Weinlander and Pinals 2019). Contributing factors to OD deaths are tolerance levels, opioid misuse, usage of opioids

outside of prescription parameters or with no prescription, opioid use disorder, as well as physiological and mental addiction to opioids (Weinlander and Pinals 2019).

To investigate some of the dynamics of this growing problem, I formulate and empirically test hypotheses derived from fundamental cause theory (FCT) (Link and Phelan 1995; Phelan, Link, and Tehranifar 2010) as a contributing explanation for opioid prescription and OD death trends in California counties. This theory proposes that disparities by socioeconomic status (SES) and race-ethnicity persist or are reproduced because access to treatments and interventions are unequally distributed, flowing more freely to those with greater access to flexible resources of knowledge, money, power, prestige, and beneficial social connections (Phelan et al. 2010).

Per FCT, in the early stages of the opioid epidemic when prescriptions were seen as having a pain-reducing benefit, we would expect counties with more privileged groups (in this study white non-Latinx) to use their flexible resources to procure opioid prescriptions more readily and at higher rates than counties that are populated with more marginalized groups. Later, however, as awareness of the negative effects of opioids became known, per FCT, we would expect that these counties with privileged groups would use their flexible resources due to county funding, such as education and awareness programs, to reduce their procurement of opioid prescriptions at a faster rate than the counties with more minoritized groups. Based on this reasoning, I predict that early in the epidemic, rates of prescriptions and opioid deaths will be higher in counties whose compositions are more white, but that as the harms of prescription opioids become more evident, rates in areas that are more white will go down faster than the rates

in counties that are less white non-Latinx (Link and Phelan 1995; Phelan et al. 2010). I test these hypotheses using state opioid registry data to determine county-level trends in opioid prescriptions and opioid OD deaths for each of California's 58 counties over the years of 2008-2018.

BACKGROUND

Racialized Societal Responses to Different Drug Epidemics

Historically, urban, minoritized communities have not received the same therapeutic response to addiction as the modern opioid epidemic has witnessed. Specifically, whereas previous minority drug panics have been presented as moral failings in communities of color, the current opioid epidemic has not been presented in this way. Instead, it has been explained by other factors such as over-prescribing by physicians (Lassiter 2015; Netherland and Hansen 2017). There is strong evidence that a racist context has shaped epidemics. Researchers have noted the similarities of the current opioid epidemic and the 1970's-80's heroin and crack cocaine epidemic in terms of devastation to communities. The difference is that the heroin/crack epidemic plagued people of color (POC), while this modern epidemic predominately plagued White-middle class, non-Hispanics, in rural and suburban spaces – at least early in the epidemic.

The crack epidemic birthed the "War on Drugs," initiated by the U.S. government and leading to the over criminalization of drug offenses that contributed to the era of mass incarceration of Blacks (Alexander 2020). The problem was rooted in addiction but met with punitive disciplinary consequences that did nothing to reduce street level drug activity. Instead of the introduction of harm reduction to communities or other therapeutic

treatments, militarization of the police forces increased and communities were ravished with brutality that impacts POC to this day (Cooper 2015). This governmental response has led to staggering disparities: Black Americans are imprisoned at 5 times the rate of White Americans and Latinx Americans are imprisoned at 1.3 times the rate of White Americans(Drake et al. 2020a; Nellis 2021). The history of this differential response to the crack cocaine epidemic on the one hand and the emerging opioid epidemic on the other strongly suggests the salience of race and racism and leads me to hypothesize a continuing significance of race as the opioid epidemic has unfolded over time.

Health Disparity Lens: Race-Ethnicity

Historians, observers, and researchers have argued that the change in drug policy from criminal justice-focused, "War on Drugs" to public health-focused approaches was due to the fact that opioid impacts were originally and predominantly in white communities. This involvement of whites made therapeutic interventions and political endorsements of life-saving drugs more appealing (Bennett et al. 2020; McDonald, Campbell, and Strang 2017; McLean 2017; Netherland and Hansen 2016; Pierce 1999). Meanwhile, policing of drug use and access to treatment or prevention did not change in Black and Latinx communities (Bennett et al. 2020; Courtwright 2001; Drake et al. 2020b; Musto 1973, 1989). This fact has implications for the social, economic, and political conditions of communities facing increased opioid usage and OD deaths, leaving them vulnerable at different levels of society (Campbell 2020). National and regional trends of the opioid epidemic continue to be disproportionately patterned by social factors in status SES standing, and race-ethnicity (Bennett and Elliott 2021).

The face of the opioid epidemic has been primarily white and belonging to rural/suburban spaces—a profile encapsulated in the term "deaths of despair" which is applied to suicides and drug and alcohol–related deaths of middle-aged white Americans in predominantly rural spaces (Case and Deaton 2015). OD death rates have overwhelmingly and consistently plagued the white population, but some policy makers have recognized that whites are not facing the same criminalization that people in urban minoritized communities faced in past drug epidemics (Drake et al. 2020b; Nellis 2021).

Working in the forefront are the goals of a dominant race (whites) to defend a collective interest of the perpetuation of systemic white privilege utilizing *racial ideology*, which is a "racial framework used by actors to explain and justify (dominant race) or challenge (subordinate races) the status quo" (Bonilla-Silva 2022). These concepts are relevant to the current research and as such, I will provide examples. In the beginning of the opioid epidemic, there was evidence of whites' access to healthcare and opioid prescriptions which led to mortality due to opioid OD's. This drug use and death invoked therapeutic versus criminalizing responses from media, the government and communities adversely effected. When knowledge of negative opioid effects was attained, whites used their privilege in the racial order and began to use fewer opioid prescriptions overtime. Despite a history of lower rates of opioid misuse and opioid OD deaths among POC compared to whites, there has been a recent growth in OD deaths among African Americans in the U.S. Studies with data from 1999-2020 show that beginning in 2013, there was an acceleration in OD death rates among POC (Drake et al. 2020b; Furr-Holden et al. 2021). More work now focuses on the stories from POC to reveal what is really

happening in this racialized epidemic (Drake et al. 2019, 2020b; Samuel 2017). Although this present work does not focus on such a microlevel, there is still great importance in uncovering the macro level effects of this epidemic on different racially diverse populations.

Some geographic locations have been threatened with worse outcomes for people of color's OD deaths. Factors contributing to those worsened OD deaths rates include pervasiveness and availability of prescription opioids in white spaces and a historical amount of under-prescribing to POC. Secondly, there is an overwhelming availability of potent new non-methadone synthetic opioids, and lastly, there is a lack of evidence-based culturally inclusive treatment solutions (James and Jordan 2018; Pletcher et al. 2008). This study focuses on the prescription patterns in the state of California and how they may relate to OD death patterns in different racial/ethnic communities, creating health disparities.

Contributors to under-prescribing in minority communities are structurally multilayered and embedded in racial frameworks. One of the questions posed in this study is; will under-prescribing to minoritized communities relate to the racial disparities found in the beginning of the epidemic (i.e., whites receiving more opioid prescriptions and experiencing higher mortality rates)? Under-prescribing in minoritized communities began with the POC's lack of health insurance and healthcare practitioners' biases against minority patients. Doctors or other healthcare practitioners may assume that patients are doctor shopping, looking for multiple prescribers of pain medications, as well as falsely assuming higher pain tolerance levels, and in turn, they do not prescribe. Under-prescribing unintentionally protected POC from opioid OD deaths in the early stages of the opioid

epidemic (Buchmueller and Carey 2018; Drake et al. 2020b; Hansen and Netherland 2016). However, under-prescribing in the health care system may have become a risk factor for POC later in the epidemic by encouraging use of more dangerous drugs. Street-purchased opioids are laced with very potent synthetic opioids, such as fentanyl and are about 100 times more potent than morphine, found in counterfeit pills, heroin, and cocaine. Likewise, under-prescribing could be a risk factor by encouraging use of illicit pharmaceuticals, cocaine, and heroin (Drake et al. 2020b; Hansen and Netherland 2016; James and Jordan 2018).

Exacerbating racial-ethnic differences in OD deaths are racial inequities in substance use prevention and treatment and the persistent lack of overdose prevention resources in communities of color. POC differentially navigate, access, and receive harm reduction for addiction, contributing to increased OD mortality rates, even as solutions like naloxone, a lifesaving opioid reversal medication, become more widespread (Hansen et al. 2013; SAMHSA 2020). The overall societal response to the opioid epidemic starkly contrast with the heroin and crack cocaine epidemic that we know exasperated social inequalities and health disparities (Drake et al. 2020a).

Aims and Hypotheses

Based on the preceding review of literature on the racialized responses to drug epidemics in America, I will now present the study aims and hypotheses that are derived from this reasoning. To my knowledge, no prior research explores racial-ethnic disparities in opioid prescription access at different points in time, in California pharmacies within different counties. Therefore, I aim to examine whether time-period differences in racial-

ethnic disparities may exist due to racialized opioid prescription access. Focusing on the rate of Whites accessing prescriptions in areas dominated by whites in the earlier years of the epidemic during the years 2008-2012.

California communities have had ample time to adjust to policies that aim to reduce the opioid epidemics effects. Such policies include efforts to provide access to and increase the availability of OD-reversing medications and community rehabilitations programs that treat opioid addiction. Yet, because racial inequalities existed in opioid prescribing access in early stages of the epidemic, it may be that these policies were more prevalent in areas with many Whites. Thus, POC would have less access to these policies and thus, be less able than Whites to reduce the epidemic's effects once the epidemic took hold in their communities. I aim to compare the opioid prescribing and OD death trends in minoritized communities and white communities.

Given opioid prescription patterns in California counties, if mechanisms of fundamental cause theory are operating then:

H_1: Counties that are populated with more whites will access more opioid prescriptions in California pharmacies in earlier years (2008-2012) of the opioid epidemic, but less access over time.

H_2: Counties that are populated with more whites will experience more OD deaths in earlier years (2008-2012) of the opioid epidemic but utilize their dominant status in the social structure to invoke flexible resources (i.e., race/ethnicity, social connections, education) and OD deaths will decrease in later years (2013-2018).

Fundamental Cause Theory

This project employs Fundamental Cause Theory (FCT) because that theory provides an avenue for understanding the spread of the opioid epidemic in California. Its focus on flexible resources suggests the possibility that as knowledge of the harmful effects of prescription opioids developed, people in dominant races, with more resources and societal advantages, would use those resources to protect themselves. In more blunt words, the U.S. is highly focused on socially constructed categories of race that produce real effects: in this case health disparities that are perpetuated by systemic racism. This focus on categorical race/ethnicity is a racial structure that has historically benefited privileges to Whites over POC, aka, White supremacy (Bonilla-Silva 2022). In what follows I describe FCT and then spell out its application to the spread of the opioid epidemic in California.

FCT aims to decipher the emergence and reproduction of social inequalities in health, investigating why they persist and reproduce, despite tremendous medical and public health advancements that can include: continuously improving knowledge about health-related risks, the development of effective treatments (e.g., pharmaceuticals, vaccines), and widespread public health interventions (e.g., sanitation, smoking campaigns).

As formulated by Bruce Link and Jo Phelan(1995), a fundamental social cause of health inequalities must include the following four features: (1) it must influence more than one disease or health outcome, (2) affect disease outcomes through multiple risk factors, (3) involve access to flexible resources that can be used to navigate and avoid risks that

minimize the consequence of the disease or health outcome, and (4) have a persisting association with health through the replacement of intervening mechanisms over time (Link and Phelan 1995; Phelan et al. 2010)

Flexible resources play a central role in FCT, emphasizing that SES, race-ethnicity, and other social positions entail differential access to knowledge, money, power, prestige, and beneficial social connections, like social support and networks. The deployment of flexible resources can transcend major risks of morbidity and mortality that may exist in a particular historical period. These flexible resources operate at the individual and contextual levels. Fundamental causes become evident when there is a change over time in a disease, treatment, risk, or knowledge of risks that provide differential situations of health and allow for the transportability of flexible resources from one situation to another. Groups privileged with the flexibility to know about, gain access to, can afford, and have social support for health enhancing and health protective behaviors can be less afflicted by disease. These resources shape the gradient of health and are associated with risk and protective factors. They create a protective web of benefits that do not depend on a person's initiative or ability to construct a healthy situation because they live in the broader context of an environment that allows for more engagement in health enhancing or health protective behaviors. The broader context would be something like a neighborhood in which a person resides in. Contexts include but are not limited to families and friend networks and neighborhood or local social and physical environments. If an individual is considered high SES and lives in a wealthy neighborhood, there is an accumulation of resources between themselves and their neighbors which is enough to have run off benefits

considered “add-ons” that can operate at the contextual level. Collectively, they can control the crime, noise, violence, esthetics, pollution, traffic, healthcare facilities, green space, and availability of food (Phelan et al. 2010).

Numerous studies have applied the FCT framework to understand how SES and racial disparities in a range of health-related outcomes emerge and persist over time. In early studies, Link et al. (1998) presented evidence to show screening rates for certain types of cancers were positively associated with education and income (Link et al. 1998). Phelan (2010), presented evidence linking SES and health in an example of cancer screenings and early detectors of cancer (Phelan et al. 2010). After the life-saving screening procedures were developed, people with more resources could use their resources to gain access to them. This work fills important gaps in the medical sociology and health disparities literatures. However, the following tests of FCT are particularly relevant for the present study.

Profound differences between Black and White Americans in every measure of SES have been found. Rubin and colleagues (2010) examined the SES and racial-ethnic inequalities in HIV/AIDS mortality in the U.S. before, during, and after the introduction of Highly Active Anti-Retroviral Therapy (HAART). Major similarities of the HIV/AIDS epidemic and the opioid epidemic can be drawn, outlining the way disease disproportionately ravishes minoritized communities once resources have become available to help ease the effects of the problem at hand. In 1996, when HAART became available, all SES, age and racial-ethnic groups experienced a decrease in HIV/AIDS mortality rates. Consistent with FCT, compelling evidence was found that novel

interventions were created and contributed to making the disease more treatable, but the benefits were not equitably distributed. Incidence rate ratios that compared Blacks to Whites and people from low-SES counties to people from high-SES counties showed a differentiation in HIV/AIDS deaths. Specifically, Blacks experienced death rates of 3.7 times greater than those for Whites during the pre-HAART period. During the peri-HAART period Blacks experienced death rates of 5 times those for Whites. During the post-HAART period, Blacks experienced death rates 8 times greater than those for Whites. This study concluded that replication of similar patterns with other lifesaving innovations would exacerbate health disparities due to the maldistribution of health improving/lifesaving resources.

The second relevant study applied FCT to a nationally representative sample of U.S. adults to analyze the association between SES and prescription opioid use behaviors (Nicholson Jr 2020). Aligned with FCT, individuals in higher SES categories had significantly lower odds of prescription opioid use behaviors over time. In this study the flexible resources that supported this finding were health care access and social support, proving that information shared between others in this SES category was potentially beneficial to their health. Overall, the investigator called for the reduction of SES disparities in health and access to health enhancing resources.

As important as these findings are to the contribution of evidence that SES functions as a contributor to health outcomes, Phelan and Link (2015), explored the effects of systemic racism on health and found that racism reduces flexible SES resources. They found that when SES was controlled for in each criterion of FCT, racism worked

independently. This finding is evidence that systemic racism is a fundamental cause that furthers the advantages of privileged groups with access to flexible resources that save their lives. This section shows that many study designs can help understand which association between social characteristics, such as SES, are most influential in generating health disparities. This present study will focus on race/ethnicity to better understand its relation to opioid prescription rates and OD deaths.

Opioid Prescription Patterns as a Test of Fundamental Cause Theory

Flexible resources in counties might create new mechanisms linking race-ethnicity to health. First, highly addictive opioids were prescribed very generously in the 1990's under the guise of safe, non-addictive pain management. As time passed, lawsuits were filed against opioid corporations, more information about industry-sponsored medical education, biomedical opioid research, and internal accounts of opioid marketing strategies were made publicly available and viable for researchers to evaluate and discover patterns of prescribing.

One concept that might explain prescribing patterns is termed *pharmaceutical splitting* which is a metaphor to explain corporate manipulation and polarization of imagery attached to certain pharmaceuticals. This creates an all-or-nothing binary where a narcotics-targeted population or its associated disorder is split as inherently bad or good. In the case of opioid prescriptions, the color labels derived from race/ethnicity (i.e., White and Black/Brown) are the binary deemed judgmental for the receivership of prescriptions. The results of this marketing and access by Whites would be comprehensible in the original mortality rates of the opioid epidemic. On the other side of the spectrum, the non-white,

opioid abuser would be depicted as a criminal and could not be prescribed medications safely due to their said proneness to addiction. Pharmaceutical splitting could have also been encouraged by Purdue Pharma when they redefined addictive symptoms as "breakthrough pain" and advocated for higher dosages when prescriptions were being made. This also allows clinicians to recategorize patients from addicted to under treated, salvaging the white patient and continuing the racial ideology that supports white group-based conditions and experiences that inform the world of what it's supposed to be (according to the dominate race) (Bonilla-Silva 2022; Parker and Hansen 2021). This clinical discourse makes "white-middle class" a resource that can be invoked even when displaying addictive behaviors due to White supremacy.

Whites' invulnerability to addiction was disproved as faces of whites addicted to drugs began to surface in mainstream media, tied with language like "suburban housewife" and "white college athletes." Pain tolerance levels transformed into a much lower threshold and these folks went from drug use for supposed "pain management" to drug use for withdrawal avoidance (Carroll n.d.; Lee 2013; Michels 2008; Netherland and Hansen 2016). The Whiter the portrayal of the opioid crisis, the more humanizing the person behind addiction was and the more accepted. This shift brought a discussion about addiction to opioids, and the "true" danger of these prescriptions underwent major scrutiny of how to address these issues in forms of treatment. Ultimately, knowledge within a dominant race was a resource that shaped the gradient of health, and this study will be explore it to be associated with risk and protective factors.

Methods

I test the hypotheses for this project by linking county-level data from two publicly available sources. First, rates of patient prescriptions and opioid-related deaths were extracted from the California Opioid Overdose Surveillance Dashboard (California Department of Public Health 2020). Second, county-level measures of the total population and population by sex, age, median household income, and race-ethnicity came from the American Community Survey (five-year estimate) data, archived as part of the Integrated Public Use Microdata Series' (IPUMS) National Historic Geographic Information System (IPUMS NHGIS 2020). The county-level data cover all 58 counties of the state. The data from both sources cover the period 2008-2018, with demographic data from 2008 missing due on IPUMS.

Measures

Independent Variables

The independent county-level variables are as follows: race-ethnicity, with categories, and % white non-Latinx. A unique variable to capture periods in time in each county was *year*. This time variable included the years 2008-2018. I also use quartiles to categorize counties in California that were predominantly white and counties that were least white and had majority communities of color, as resources will have been distributed with a pattern of inequity according to race/ethnicity among other contributing demographics. There were 3 dummy variables to represent quartiles of the percent white in a county (lowest quartile is the reference group). Quartiles range from least white represented in the reference group quartile 1, to most white represented in quartile 4. Then

the cross-product terms are utilized to assess the interaction of time(years) with each quartile.

Dependent Variables

Outcome variables include county-level rates of opioid prescriptions and opioid mortality over a 10-year period in all 58 counties of California. ***Opioid prescriptions by patient location*** are defined as schedule II, III, and IV prescription opioids dispensed to patients and entered into the Controlled Substance Utilization Review and Evaluation System (CURES), which is a data base tracking these scheduled drugs and apart of the California's prescription drug monitoring program (PDMP). The United States Drug Enforcement Administration classifies drugs into five categories or schedules that depend on the drug's acceptable medicinal usage, as well as the drug's abuse or dependence potential. The abuse rate is considered when factoring in the schedule of drugs. A Schedule I drug has the highest abuse potential and can create the greatest number of problems, like severe psychological or physical dependence for people using them(U.S. Department of Justice 2020). Therefore, opioids fall in three schedules mentioned above due to differential abuse rates. Indicators used to determine opioid prescriptions were by patient and based on patient county. Crude rates of prescription were calculated by dividing the number of prescriptions in California by county *i* and year *j*.

Opioid-related deaths are defined as drug overdose deaths caused by acute poisonings that involve any opioid as a contributing cause of death, regardless of intent (e.g., unintentional, suicide, assault, or undetermined). Opioids include prescription opioid pain relievers (e.g., hydrocodone, oxycodone, and morphine), heroin, and opium.

Mortality indicators were predetermined from ICD-10 codes and used by the CA opioid dashboard, which are standard transaction codes for diagnostic purposes under the Health Insurance Portability and Accountability Act (HIPAA). The National Center for Health Statistics codes all causes of death according to the International Classification of Diseases (ICD), version 10 for mortality. These codes are used to track healthcare statistics/disease burden, quality outcomes, mortality statistics, etc., and therefore, are predetermined (Finance 2021). Deaths with any of the following ICD-10 codes as the underlying cause of death were used: X40-X44 accidental poisonings by drugs, X60-X64 intentional self-poisoning by drugs, X85 assault by drug poisoning, Y10-Y14 drug poisoning of undetermined intent. Previous ICD-10 codes needed to be listed with any of the following multiple causes of death codes: T40.0 opium, T40.1 Heroin, T40.2 Natural and semisynthetic opioids, T 40.4 Synthetic opioids, other than methadone, and T40.6 other and unspecified narcotics. Deaths related to chronic use of drugs (e.g., damage to organs from long-term drug use) are excluded from this measure. Crude opioid-related death rates were calculated by dividing the number of individuals who died of opioid drug overdoses in county *i* and year *j* by the corresponding population *i* in county and zip codes and year *j*. [1]

Control Variables

The models also control for the gender (% male) and age composition of the counties. The age category of interest was % >60 years. I specifically, control for % above 60 years, due to the likelihood that this age category would be obtaining prescriptions at higher rates due to health issues associated with older age (Brown 2018). I control for

gender due to different exposure rates to prescription opioids among women versus men. Women are more likely to be prescribed opioids and at longer durations than men leading to more women initiating opioid misuse (Martin, Scialli, and Terplan 2021). I also control for median household income ranging in categories from less than $10,000 to $200,000 or more, due to the robust documentation of socioeconomic inequalities in health and mortality, with consideration for the SES resources that accompany wealth (Phelan et al. 2010).

Table 1 displays descriptive statistics for the independent and control variables from California counties (n=58) for years 2009-2019, excluding 2008 due to unavailable/missing data for some variables. These descriptive statistics had the year 2019 available for chosen variables and was utilized for this table.

Table 1: Descriptive statistics for all independent variables for California counties (n=58) for 2009-2019

	Median household income	% Black	% Latinx	% Asian/Pacific Islander	% White	Male	Under Age 20	Ages 20-39	Ages 40-59	Over 60
2009	54883.707	3.224	26.472	6.534	59.361	50.817	27.363	25.762	28.616	18.258
2010	55265.723	3.13	27.472	6.856	58.072	50.76	27.094	25.602	28.545	18.758
2011	55892.344	3.143	28.003	6.932	57.491	50.658	26.809	25.622	28.239	19.33
2012	55826.414	3.096	28.458	7	57.06	50.711	26.468	25.529	28.086	19.918
2013	55558.016	3.07	28.854	7.027	56.559	50.773	26.138	25.554	27.704	20.604
2014	56034.363	3.032	29.19	7.11	56.053	50.654	25.751	25.773	27.219	21.257
2015	56013.156	2.991	29.524	7.249	55.557	50.677	25.461	25.879	26.728	21.932
2016	58091.242	2.959	29.762	7.274	55.252	50.687	25.289	25.918	26.282	22.511
2017	61046.758	2.945	30.074	7.355	54.763	50.624	25.078	26.008	25.728	23.186
2018	64378.551	2.964	30.323	7.5	54.264	50.583	24.893	26.171	25.22	23.716
2019	67713.602	2.984	30.622	7.587	53.745	50.625	24.686	26.121	24.887	24.306

Statistical analysis

All analyses were conducted using Stata 16. To test my first hypothesis(H_1), *In earlier years of the opioid epidemic, counties that are more White access more opioid*

prescriptions in California pharmacies, regression analyses examined the extent to which racial-ethnic disparities in patient prescriptions in California counties changed over time or were affected by other county demographics. Data transformation set up variables in panel and random effects with a Generalized Least Square regression was utilized.

In equation 1, I show the association entering year and three dummy variables capturing quartiles of % white non-Latinx. Next, to determine the extent to which the sets of covariates accounted for the association between race and patient prescriptions, I conducted a series of six regressions that adjusted sequentially for covariates of interest. These regressions were used to examine the independent association between each covariate and patient prescription crude rates, adjusting for % Male, ages above 60, and median household income.

Equation 1 first adjusted for the white population as this question focuses on % whites' accessibility to opioid prescriptions in CA counties and is thought to be strongly related to determinants of health disparities. Equation 2 considers the effect of % whites across all the years together. I use quartiles to categorize counties in CA that were predominantly white and counties that were least white and had majority communities of color. Then the cross-product terms are utilized to assess the interaction of time(years) with each quartile. Equation 3-6 were used to determine if there were any more significant findings individually and lastly all in combination to see if anything was effective. Equation 3-6 additionally adjusted one at a time for % Male, ages above 60, and median household income to determine their impact on patient prescription accessibility in CA counties. A final regression included all sets of covariates.

To test the second hypothesis (H_2), *Do counties that are populated with more whites experience more OD deaths in earlier years of the opioid epidemic but a decrease in OD deaths in later years?* Regression analyses were conducted to examine the extent to which racial-ethnic disparities exist in OD deaths in California counties among whites versus communities of color over time or were affected by other demographics that may put certain populations at higher risk of OD deaths, such as sex, age, or income.

First, I showed the association entering year and three dummy variables capturing quartiles of % white. Then examined the interaction of % white and year. Next, to determine the extent to which the sets of covariates accounted for the association between race and OD deaths, I conducted a series of seven regressions that adjusted sequentially, for covariates of interest. Including examining the independent association between each individual covariate and OD death crude rates, adjusting for % Male, ages above 60, and median household income. Equation 1 first adjusted for the white population as this question focuses on the potential differences in OD death rates in CA counties over time. Equation 2 furthers the exploration of the effects of racial composition by adjusting for the percent of "whiteness" of counties in California. Quartiles range from least white represented in quartile 2, to most white represented in quartile 4. Then the cross-product terms are utilized to assess the interaction of time(years) with each quartile. Equation 3-7 were used to determine if there were any more significant findings individually and lastly all in combination to see if anything was effective. Equation 3-7 additionally adjusted one at a time for county patient prescriptions, % Male, ages above 60, and median household

income to determine their impact on OD death rates in CA counties. A final regression included all sets of covariates.

To facilitate observations of any racial-ethnic disparities over the observation period, I used the margins and margins plot commands to estimate (and graph) year-specific predicted values and test the statistical significance of between-group differences (via average marginal effects).

Results

Figure 1. shows crude rates for the outcome variable for pharmacy-issued prescriptions by patient location per 1,000 persons for years 2008 to 2018 in CA. In 2008, there were just above 700 prescriptions per 1,000 persons, which peaked to the high above 800 per 1,000 persons by 2011 before declining between 2014 and 2018 to just below 600 per 1,000 persons. This result makes sense as CA's approach to addressing the opioid epidemic was to reinvigorate their Prescription Drug Monitoring Program (PDMP) in 2016, which is a state level-controlled substance data base that registers prescribers and pharmacists to inform prescribing decisions (Castillo-Carniglia et al. 2021). Improvements included proactive reports to prescribers that detected when a patient surpassed certain prescribing thresholds such as dosage levels of prescription, number of prescriptions from collective providers, and how many pharmacies had been utilized for patient prescription fillings in the last 6 months among other thresholds. Although opioid prescriptions may have declined in these years, OD deaths have surged on (Castillo-Carniglia et al. 2021; Grecu, Dave, and Saffer 2019; McDonald et al. 2017; Young, Kreiner, and Panas 2018).

Figure 1: Crude Rates for Pharmacy-issued prescriptions by patient location (per 1,000) by Year in California

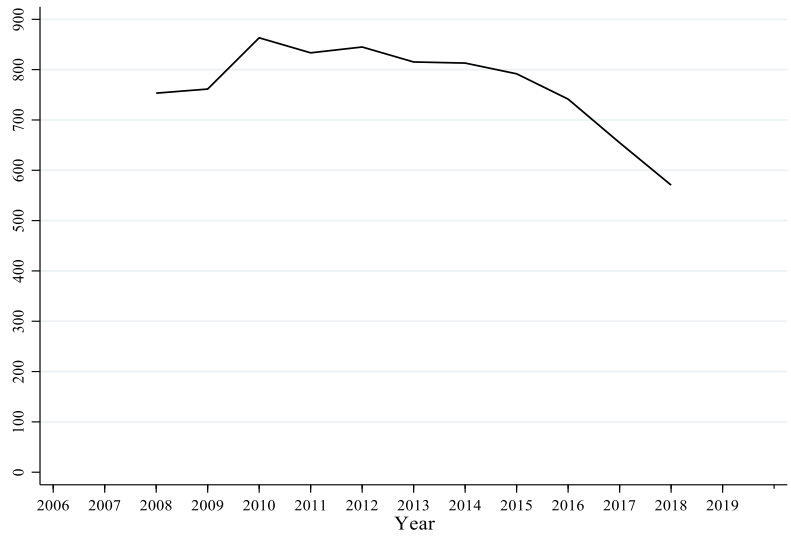
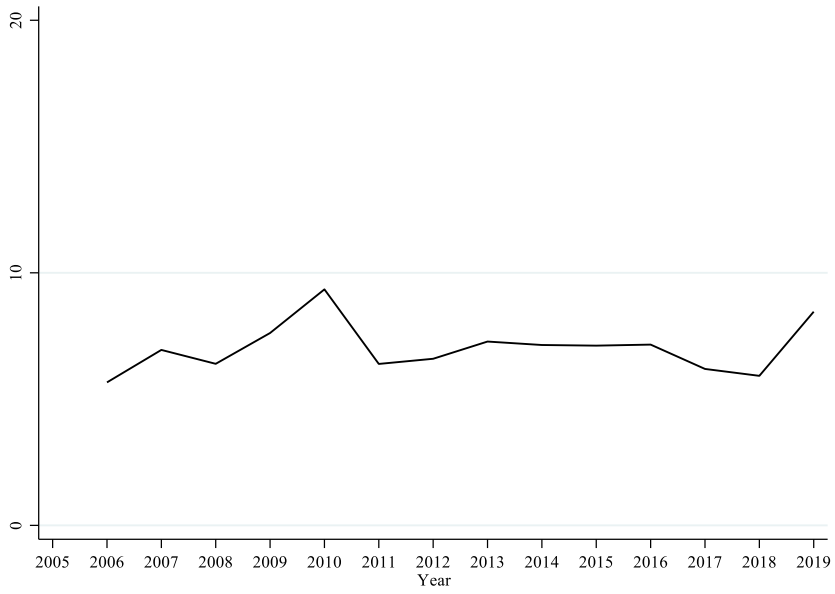


Figure 2 describes all opioid-related overdose deaths per 100,000 persons for the years 2006 to 2019 in CA. In 2008, 5 overdoses occurred per 100,000. By 2010, there were nearly 10 overdoses per 100,000 persons and a plateau begins through 2011 to 2018. In 2018 a small increase in overdoses begins going from 6 to 8 overdoses per 100,000 persons. My results show the beginning of an upward tick towards more OD deaths in the State of CA that could be a result of a shift from opioid prescription misuse to illicit opioid use in the US including illicitly made fentanyl in the years after 2010, lending to the increase in opioid OD deaths (Kral et al. 2021; Mattson 2021). For example, places like San Francisco, CA had a 270 percent increase in OD deaths during the years 2018 to 2020 which included 259 opioid OD's in 2018, 442 opioid OD's in 2019, and 699 in 2020 (Kral et al. 2021; Thadni 2021). Including a 72% increase in OD deaths from fentanyl in 2020 (Kral et al. 2021; Rodda 2021).

Figure 2: Crude Rates for All Opioid-related Overdose Deaths (per 100,000) by Year in California



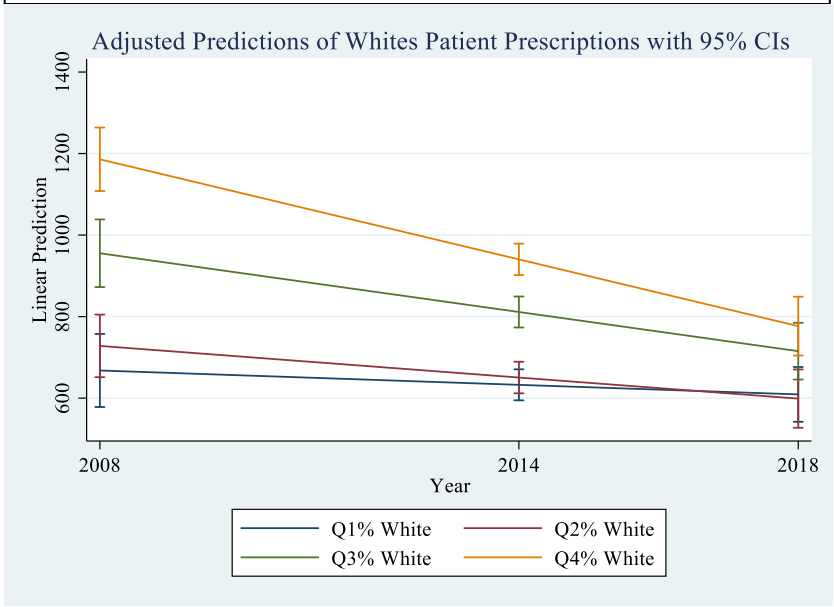
Multivariate results

Table 2 contains the regression results for county-level prescriptions rates. The negative coefficient in equation 1 shows that there is a significant decrease over time in patient prescriptions rates ($\beta = -16.74$, $p = < 0.001$).

In equation 2 the interaction terms for both quartile 3, quartile 4 (that is, counties with larger white populations) are each significantly negatively associated with patient prescriptions ($\beta = -20.36$, $p = < 0.001$; $\beta = -27.61$, $p = < 0.001$). Figure 3(A) illustrates patient prescriptions over time with race. The far left of the figure shows that in 2008, prescription rates were highest in counties with more whites, relative to counties with fewer whites. The far-right of the figure shows that in 2018, prescription rates were still highest

in counties with more whites, but they had declined substantially. This result supports H_1. It shows a staggering racial difference in opioid prescription rates across time. Quartile 4, in the color orange, has a rate that is almost double that of quartile 1, represented in the color blue in 2008. By 2018, Quartile 4's rate significantly decreased and almost reached parity with Quartile 1, whose rate barely changed since 2008.

Figure 3(A): Graph of Adjusted Predictions of Whites Patient Prescriptions Rates



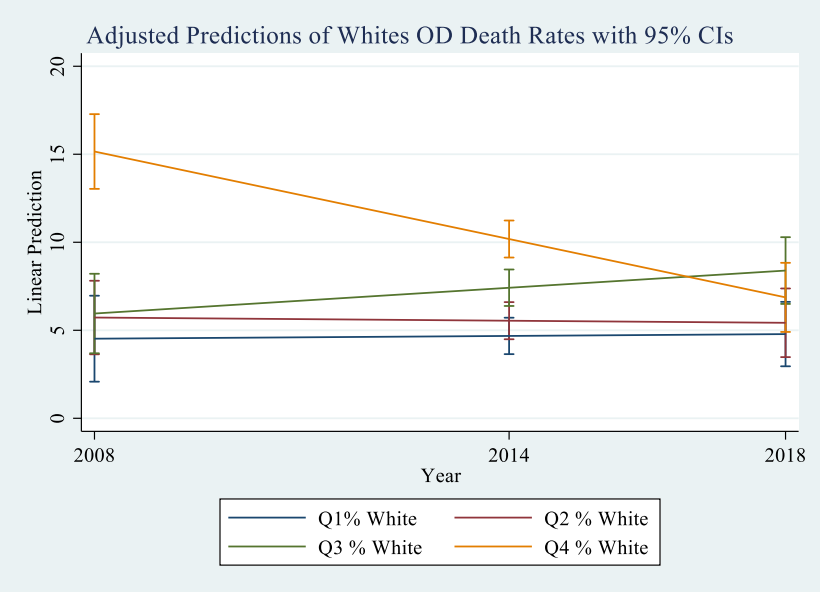
Equations 3, 4, and 5, in Table 2 each add county-level covariates: % Male, %60 plus years old), and median income, respectively. Equation 6 is the full model with all covariates and the key independent variables. Counties with larger percentages of people over 60 have higher prescription rates – a finding that makes sense because opioids are prescribed for conditions associated with pain and these are more common in elderly populations. Also, whether entered individually or with other covariates, higher county median income is associated with lower prescription rates. Most importantly, the terms for

the interaction of year and quartile %white remain statistically significant even after controlling for all covariates (equation 6).

Table 3 shows the regression results for opioid overdose death rates. In equation 1 the variable capturing year (2008-2018) is not statistically significant. For equation 2, the interaction term for Quartile 4 (that is, counties with larger white populations) are significantly negatively associated with OD deaths over time ($\beta = -0.841, p = < 0.001$) compared to areas that were predominantly communities of color.

To show the interaction visually I've constructed a graph of OD deaths over time with race in Figure 3(B). The far-left shows years 2008, whites were predicted to experience more OD deaths in the earlier stages of the opioid epidemic, and by 2018 the white areas have dropped dramatically thereby supporting the fundamental cause hypothesis and H_2. This figure shows counties that are whiter experience more OD deaths in earlier years of the opioid epidemic but a decrease in OD deaths in later years. Quartile 4 %white, represented in the color orange, shows over time a staggering difference in OD deaths more than doubling that of quartile 1 %white, represented in the color blue in 2008. By 2018, quartile 4 %white dramatically decreased and almost reached quartile 1 %white, which had barely changed since 2008.

Figure 3(B): Graph of Adjusted Predictions of Whites OD Death Rates



Notably in equation 3, patient prescriptions are added and there is a significant finding ($\beta = 0.00832, p = < 0.001$). Controlling for patient prescriptions, the interaction between race quartile and year remains statistically significant, but the coefficient for year becomes statistically not significant.

Equation 4, 5, and 6, each add covariates: % Male, %60 plus years old, and median income respectively. Equation 7 is the full model with all covariates and the key independent variables. Whether entered individually or with other covariates, higher county median income is associated with lower OD rates. Most importantly, the critical fact of interest, the interaction of year and quartile % white remains statistically significant, regardless of the control variables entered in Equations 3 through 7.

In this paper I addressed the racial inequalities of the opioid epidemic regarding the access to opioid prescriptions and OD deaths throughout time in CA counties. Results were

consistent with FCT, involving resources at the county level that determined the extent to which whites were able to avoid multiple disease outcomes, such as OD deaths, involving the opioid epidemic.

DISCUSSION

This project set out to determine whether the consequences of the opioid epidemic travels through society in an unequal way. I assembled data over time to analyze patient prescriptions and OD deaths in CA counties. Results were consistent with FCT: resources determined the extent to which counties that had higher white populations were able to avoid risks for morbidity mortality. Although not tested, this leads me to speculate that systemic racism is influencing whites' flexible resources via multiple replaceable mechanisms, such as accessibility to health care, doctor trust, or normalization of pain management via western medicine. What we do understand from this study is that counties with higher white populations could invoke their racial/ethnic status within the networks of systemic racism. FCT scholars have uncovered evidence of status, specific to race in implicit evaluations of "good" and "bad," like that of "pharmaceutical splitting," labeling whites as sick patients in need of help and Blacks as criminal drug addicts. These labels are upheld in county budget allocations for criminal justice versus rehabilitation. Another protective feature and resource that may be invoked to avoid risk-factor mechanisms is beneficial social connections that can collectively benefit white individuals in one of the worst epidemics. For example, racial segregation is long documented as a continuous factor of inequalities, whites are positioned in white

neighborhoods that expose them to health saving resources that are not as likely to be found in communities of color (Phelan and Link 2015). These racial mechanisms in the opioid epidemic have lodged a divide in the effects of OD death on different race/ethnicities.

Results exemplified opioid abuse's negative effects in the form of OD death in CA counties. In the beginning of the opioid epidemic OD death rates for counties with more white non-Latinx populations were high but counites with more whites had a substantial decrease in OD death rates in later years (2013-2018) of the opioid epidemic. *White privilege* is utilized as a protective mechanism to access individual flexible resources of money, knowledge, power, prestige, and beneficial social connections at the county level to avoid OD deaths. Whether it was accessing fewer opioid prescriptions, addiction treatment services, or evading interaction with law enforcement for illegal drug use, counties with more whites seem to be faring better in later years of the opioid epidemic.

Limitations: Drug overdose data cannot tell the whole story due to the undercount of deaths that relate to prescription opioids that could occur because the CDC does not include deaths associated with pharmaceutical fentanyl, tramadol, and other synthetic opioids used as pain medication. Other challenges to overdose data usage are the lack of specification of drugs listed on the death certificate. In 2018, 8% of drug overdose deaths had no specific drug listed with the cause of the death on the certificate (Rudd et al. 2014). Multiple drugs are usually present in many of these deaths due to the changing market for

illicit fentanyl, heroin, counterfeit pills, and cocaine (CDC 2021a; Roehler et al. 2019). For example, how could an overdose death be differentiated between heroin or a prescription opioid when both substances are found in the body? Even if OD deaths could not be differentiated by opioid category, my results still show a drastic decrease of whites OD deaths in the more recent years of the epidemic, which would not be strongly influenced by this limitation mentioned.

Another limitation to this study is that the health department of California only had available aggregate data at the county level. Data at this level can be limiting as it does not include more nuanced information about individuals and groups that could explain certain behaviors during the epidemic. Yet, the data in this study covers main years of interest for this project and was utilized. This data is county level, but this project could have benefited from census tract data that could provide more information to public health officials and other substance use scientists that can influence budget allocations in developing plans, including programs, education, etc., to combat racial disparities in OD deaths. I would argue that potentially more impactful policies are created at the county level and counties have more induvial power to yield in decisions to fund certain programs and departments, making this county-level data and results useful to governmental officials hopefully impacting larger population levels.

Strengths of this research include shedding light on racially patterned changes in opioid patient prescription accessibility and OD deaths in counties of California. This study contributes evidence, similar, to other studies utilizing FCT to determine underlying social,

fundamental causes that lead to differentiation in access to health enhancing and lifesaving resources. Meaning whiter geographic places have greater positive health outcomes due to their access to resources at different points in time. This work continues to empirically fill literature between medical sociology and health disparities literature using the fundamental cause theory.

Race & US Health: Previous work has found the enduring association between race and health inequalities in the U.S. rooted in racism, and this work adds to the empirical data that supports primary fundamental associations (Phelan and Link 2015). This study directly addresses racial inequalities in health that are not attributable to SES, in that the power to avoid risk or minimize the consequences of opioid abuse, addiction, and death is directly related to race-related resources at the county level.

One such resource that has not been explored due to lack of available data is naloxone. Legislative efforts to make naloxone, a highly effective, lifesaving opioid overdose reversal medication, more accessible has helped encourage a rhetoric of change about addressing overdoses, and as we see for whites. It can be safely administered to any person experiencing an OD in a nasal spray or injected into the muscle, under the skin, or into the veins (NIDA 2021). In 2014, California Governor Jerry Brown signed into law, Assembly Bill number 1535 (AB1535), which expanded naloxone access to pharmacies, permitting pharmacists to make naloxone available upon request for citizens by 2015. Despite this breakthrough medical advancement, this intervening mechanism is not positively contributing to differences in OD deaths for communities of color, as whites OD deaths have decreased significantly over time.

Power to change the health outcomes for U.S. citizens lies at least in part in the U.S. government which serves as the foundation of systemic racism. Power is one of the flexible resources, according to FCT, that is invoked when deemed necessary. In the case of the government, the intention behind power is to successfully control others to match a white agenda, ensuring resources are allocated accordingly. So, what realistic public health policies can be called on and implemented to equally protect the lives of communities of color? The opioid crisis is yet another mechanism that works in white supremacy and will be increasingly challenging to address as the elimination of racism is challenging to defeat. Fundamental causes are said to replace any mechanism that may be an effective block to health inequities, following a cycle that can infinitely link racism to health outcomes. Addressing racism in its entirety must be at the top of a policy agenda.

This work empirically supports FCT because as the negative effects of opioids were increasingly ravishing white communities, mechanisms to stop OD deaths were pursued. Whites have been able to access these lifesaving resources and the negative effects have naturally seeped into communities of color. To address racial differences in OD deaths, vigorous anti-racist, and culturally competent harm reduction programs must flood communities across CA. Even with scattered naloxone availability in pharmacies, previous studies showed that the majority of their participants sought out community based access from non-profit organizations that primarily provided services for harm reduction (Kinnard et al. 2021). Already established programs bringing in a new component to their work could train health service workers to interact in a culturally competent way with people who use opioids. Another possibility would be to ensure

equal access to information about the harms of opioids, including OD deaths but also options for help in recovery or instruction and access to naloxone.

The National Drug Control Strategy for 2022 was recently released and includes major ideas to address the opioid crisis but is overshadowed by one of the largest ever budget increases to customs and border protection at 300 million dollars and 300 million more to the Department of Drug Enforcement (Bidden-Harris Administration 2022). This sends a very clear message of prioritization of criminal enforcement versus harm reduction and rehabilitative services. To make headway in the opioid epidemic there will need to be more funding from the government that concentrates on preventative resources for at risk communities, harm reduction services that people where they are at in addiction, and collaborations across institutions that support translational research to affect equitable policies in this matter.

Future work could include an investigation into other mechanisms contributing to racial differences in OD deaths involving naloxone access for patients and naloxone access from pharmacies, or even naloxone administration from emergency entities such as EMT's, the police, or fire fighters. With criminal justice organizations recently under scrutiny for violence towards communities of color, it would be helpful to see the differences in OD saves for different racial categories and how this contributes to OD deaths embedded in systemic racism.

If true collaborations were formed between pillars of our society in academia, criminal justice and health organizations, this could lead to translational research for

policy-decision makers that directly affect communities suffering from this drug epidemic. CA has an opioid surveillance dashboard, where this data derived from, but it's not in collaboration with criminal justice agencies, whereas other states, such as Florida and Delaware have embarked on a beneficial agency sharing relationship. This additional layer of data to the CA opioid surveillance dashboard could include, 911 calls for police service for overdose and naloxone administration and opioid drug arrests. Examination of such surveillance sites could shed light on trends and patterns of inequality from the maldistribution of resources amongst different races.

Before this investigation occurred, we didn't know how the spread of the epidemic would so drastically change and the inequalities would spread, especially because of all the previous scientific research that emphasizes the white opioid crisis. This research is important in revealing the deadly harms of systemic racism in the opioid epidemic at the county level and how history repeats itself in the form of fundamental causes in health disparities. Race-related resources as the county level will continue to be circulated in a variety of situations and related to health outcomes of those addicted to drugs if more work like this is not pursued.

References

Alexander, Michelle. 2020. *The New Jim Crow*. 10th ed.

Anon. 2022. "FACT SHEET: White House Releases 2022 National Drug Control Strategy That Outlines Comprehensive Path Forward to Address Addiction and the Overdose Epidemic." *The White House*. Retrieved May 16, 2022 (https://www.whitehouse.gov/briefing-room/statements-releases/2022/04/21/fact-sheet-white-house-releases-2022-national-drug-control-strategy-that-outlines-comprehensive-path-forward-to-address-addiction-and-the-overdose-epidemic/).

Bennett, Alex S., and Luther Elliott. 2021. "Naloxone's Role in the National Opioid Crisis—Past Struggles, Current Efforts, and Future Opportunities." *Translational Research* 234:43–57. doi: 10.1016/j.trsl.2021.03.001.

Bennett, Alex S., Robert Freeman, Don C. Des Jarlais, and Ian David Aronson. 2020. "Reasons People Who Use Opioids Do Not Accept or Carry No-Cost Naloxone: Qualitative Interview Study." *JMIR Formative Research* 4(12):e22411. doi: 10.2196/22411.

Bonilla-Silva, Eduardo. 2022. *Racism Without Racists*. 6th ed. Rowman & Littlefield.

Brown, Jane Pansing. 2018. "Opioid Abuse and Elder Justice." *Department of Justice Journal of Federal Law and Practice* 66(7):159–76.

Buchmueller, Thomas C., and Colleen Carey. 2018. "The Effect of Prescription Drug Monitoring Programs on Opioid Utilization in Medicare." *American Economic Journal: Economic Policy* 10(1):77–112. doi: 10.1257/pol.20160094.

California Department of Public Health. 2020. "CA Opioid Dashboard." *California Opioid Overdose Surveillance Dashboard*. Retrieved April 28, 2020 (https://skylab.cdph.ca.gov/ODdash/).

Campbell, Nancy D. 2020. *OD: Naloxone and the Politics of Overdose*. MIT Press.

Carroll, Linda. n.d. "Hooked: A Teacher's Addiction and the New Face of Heroin." *Today News*. Retrieved February 27, 2022 (https://www.today.com/health/hooked-teacher-s-addiction-new-face-heroin-t74881).

Case, Anne, and Angus Deaton. 2015. "Rising Morbidity and Mortality in Midlife among White Non-Hispanic Americans in the 21st Century." *Proceedings of the National Academy of Sciences* 112(49):15078–83. doi: 10.1073/pnas.1518393112.

Castillo-Carniglia, Alvaro, Andrés González-Santa Cruz, Magdalena Cerdá, Chris Delcher, Aaron B. Shev, Garen J. Wintemute, and Stephen G. Henry. 2021.

"Changes in Opioid Prescribing after Implementation of Mandatory Registration and Proactive Reports within California's Prescription Drug Monitoring Program." *Drug and Alcohol Dependence* 218:108405. doi: 10.1016/j.drugalcdep.2020.108405.

CDC. 2011. "CDC Online Newsroom - Press Release: November 1, 2011." Retrieved April 28, 2021 (https://www.cdc.gov/media/releases/2011/p1101_flu_pain_killer_overdose.html).

CDC. 2021a. "Opioid Data Analysis and Resources | CDC's Response to the Opioid Overdose Epidemic | CDC." *Opioids: Opioid Data Analysis and Resources*. Retrieved October 26, 2021 (https://www.cdc.gov/opioids/data/analysis-resources.html).

CDC. 2021b. "Products - Vital Statistics Rapid Release - Provisional Drug Overdose Data." Retrieved October 31, 2021 (https://www.cdc.gov/nchs/nvss/vsrr/drug-overdose-data.htm).

Cooper, Hannah LF. 2015. "War on Drugs Policing and Police Brutality." *Substance Use & Misuse* 50(8–9):1188–94. doi: 10.3109/10826084.2015.1007669.

Courtwright, David T. 2001. *Dark Paradise: A History of Opiate Addiction in America*. Enl. ed. Cambridge, Mass: Harvard University Press.

Drake, Jasmine, Creaque Charles, Jennifer W. Bourgeois, Elycia S. Daniel, and Melissa Kwende. 2020a. "Exploring the Impact of the Opioid Epidemic in Black and Hispanic Communities in the United States." *Drug Science, Policy and Law* 6:2050324520940428. doi: 10.1177/2050324520940428.

Drake, Jasmine, Creaque Charles, Jennifer W. Bourgeois, Elycia S. Daniel, and Melissa Kwende. 2020b. "Exploring the Impact of the Opioid Epidemic in Black and Hispanic Communities in the United States." *Drug Science, Policy and Law* 6:2050324520940428. doi: 10.1177/2050324520940428.

Drake, Jasmine, Ph.D., Jennifer Wyatt Bourgeois, and M.S. 2019. "Changing Faces: How the Opioid Epidemic Is Sweeping Across Urban Minority Communities in the U.S." *Houston Forward Times*, May 7.

Finance. 2021. "ICD-10-CM Used to Document Diagnoses but Also Affects Payment." *AAP News*.

Furr-Holden, Debra, Adam J. Milam, Ling Wang, and Richard Sadler. 2021. "African Americans Now Outpace Whites in Opioid-Involved Overdose Deaths: A Comparison of Temporal Trends from 1999 to 2018." *Addiction* 116(3):677–83. doi: 10.1111/add.15233.

Grecu, Anca M., Dhaval M. Dave, and Henry Saffer. 2019. “Mandatory Access Prescription Drug Monitoring Programs and Prescription Drug Abuse.” *Journal of Policy Analysis and Management* 38(1):181–209. doi: 10.1002/pam.22098.

Guy, Gery P., Kun Zhang, Michele K. Bohm, Jan Losby, Brian Lewis, Randall Young, Louise B. Murphy, and Deborah Dowell. 2017. “Vital Signs: Changes in Opioid Prescribing in the United States, 2006–2015.” *MMWR. Morbidity and Mortality Weekly Report* 66(26):697–704. doi: 10.15585/mmwr.mm6626a4.

Hansen, Helena B., Carole E. Siegel, Brady G. Case, David N. Bertollo, Danae DiRocco, and Marc Galanter. 2013. “Variation in Use of Buprenorphine and Methadone Treatment by Racial, Ethnic, and Income Characteristics of Residential Social Areas in New York City.” *The Journal of Behavioral Health Services & Research* 40(3):367–77. doi: 10.1007/s11414-013-9341-3.

Hansen, Helena, and Julie Netherland. 2016. “Is the Prescription Opioid Epidemic a White Problem?” *American Journal of Public Health* 106(12):2127–29. doi: 10.2105/AJPH.2016.303483.

IPUMS NHGIS. 2020. “IPUMS NHGIS National Historical Geographic Information System.” Retrieved October 12, 2021 (https://www.nhgis.org/).

James, Keturah, and Ayana Jordan. 2018. “The Opioid Crisis in Black Communities.” *Journal of Law, Medicine & Ethics* 46(2):404–21. doi: 10.1177/1073110518782949.

KHN, Kaiser Health News. 2018. “Purdue And The OxyContin Files.” *Kaiser Health News*. Retrieved April 28, 2021 (https://khn.org/news/purdue-and-the-oxycontin-files/).

Kinnard, Elizabeth, Ricky Bluthenthal, Alex H. Kral, Lynn Wenger, and Barrot H. Lambdin. 2021. “The Naloxone Delivery Cascade: Identifying Disparities in Access to Naloxone among People Who Inject Drugs in Los Angeles and San Francisco, CA | Elsevier Enhanced Reader.” 255. doi: 10.1016/j.drugalcdep.2021.108759.

Kolodny, Andrew, David T. Courtwright, Catherine S. Hwang, Peter Kreiner, John L. Eadie, Thomas W. Clark, and G. Caleb Alexander. 2015. “The Prescription Opioid and Heroin Crisis: A Public Health Approach to an Epidemic of Addiction.” *Annual Review of Public Health* 36(1):559–74. doi: 10.1146/annurev-publhealth-031914-122957.

Kral, Alex H., Barrot H. Lambdin, Erica N. Browne, Lynn D. Wenger, Ricky N. Bluthenthal, Jon E. Zibbell, and Peter J. Davidson. 2021. “Transition from

Injecting Opioids to Smoking Fentanyl in San Francisco, California." *Drug and Alcohol Dependence* 227:109003. doi: 10.1016/j.drugalcdep.2021.109003.

Lassiter, Matthew D. 2015. "Impossible Criminals: The Suburban Imperatives of America's War on Drugs." *Journal of American History* 102(1):126–40. doi: 10.1093/jahist/jav243.

Lee, Jonathan. 2013. "New Face of Drug Addiction." *FOX40*. Retrieved February 27, 2022 (https://fox40.com/morning/lifestyle/new-face-of-drug-addiction/).

Lin, Jeffrey, and Joan Petersilia. 2014. *Follow the Money: How California Counties Are Spending Their Public Safety Realignment Funds*. *SSRN Scholarly Paper*. 2395527. Rochester, NY: Social Science Research Network. doi: 10.2139/ssrn.2395527.

Link, Bruce G., Mary E. Northridge, Jo C. Phelan, and Michael L. Ganz. 1998. "Social Epidemiology and the Fundamental Cause Concept: On the Structuring of Effective Cancer Screens by Socioeconomic Status." *The Milbank Quarterly* 76(3):375–402. doi: 10.1111/1468-0009.00096.

Link, Bruce G., and Jo Phelan. 1995. "Social Conditions As Fundamental Causes of Disease." *Journal of Health and Social Behavior* 80–94. doi: 10.2307/2626958.

Martin, Caitlin E., Anna Scialli, and Mishka Terplan. 2021. "Chapter 3. Addiction: Sex and Gender Evidence in Alcohol, Tobacco Use and Nicotine Addiction, and Opioid Use Disorders | Elsevier Enhanced Reader." Retrieved March 12, 2021 (https://reader.elsevier.com/reader/sd/pii/B9780128165690000036?token=7C7A84C4717362A4E902031AC1F513154E4C04AB3A3F3B8F6C6935F84CE032FA9BC304A1C6AD6C8845765616CFFD3356).

Mattson, Christine L. 2021. "Trends and Geographic Patterns in Drug and Synthetic Opioid Overdose Deaths — United States, 2013–2019." *MMWR. Morbidity and Mortality Weekly Report* 70. doi: 10.15585/mmwr.mm7006a4.

McDonald, Rebecca, Nancy D. Campbell, and John Strang. 2017. "Twenty Years of Take-Home Naloxone for the Prevention of Overdose Deaths from Heroin and Other Opioids—Conception and Maturation | Elsevier Enhanced Reader." doi: 10.1016/j.drugalcdep.2017.05.001.

McLean, Katherine. 2017. "From 'Junkies' to 'Soccer Moms': Newspaper Representations of Overdose, 1988–2014." *Critical Criminology* 25(3):411–32. doi: 10.1007/s10612-017-9350-2.

Michels, Scott. 2008. “Heroin in Suburbia: New Face of Addiction.” *ABC News*. Retrieved February 27, 2022 (https://abcnews.go.com/TheLaw/story?id=5494972&page=1).

Murray-García, Jann L., Victoria Ngo, Theo A. Yonn-Brown, David H. Hosley, and Hendry Ton. 2022. “California’s Central Valley: Teaching Social Determinants of Health and Cultural Humility Through an Interprofessional, Overnight Road Trip.” *Journal of Health Care for the Poor and Underserved* 33(2):819–41. doi: 10.1353/hpu.2022.0066.

Musto, D. F. 1973. *AMERICAN DISEASE - ORIGINS OF NARCOTIC CONTROL | Office of Justice Programs*.

Musto, D. F. 1989. “America’s First Cocaine Epidemic.” *The Wilson Quarterly* 13(3):59–64.

Nellis, Ashley. 2021. “The Color of Justice: Racial and Ethnic Disparity in State Prisons.” *The Sentencing Project*. Retrieved October 29, 2021 (https://www.sentencingproject.org/publications/color-of-justice-racial-and-ethnic-disparity-in-state-prisons/).

Netherland, Julie, and Helena Hansen. 2017. “White Opioids: Pharmaceutical Race and the War on Drugs That Wasn’t.” *BioSocieties* 12(2):217–38. doi: 10.1057/biosoc.2015.46.

Netherland, Julie, and Helena B. Hansen. 2016. “The War on Drugs That Wasn’t: Wasted Whiteness, ‘Dirty Doctors,’ and Race in Media Coverage of Prescription Opioid Misuse.” *Culture, Medicine, and Psychiatry* 40(4):664–86. doi: 10.1007/s11013-016-9496-5.

Nicholson Jr, Harvey. 2020. “Socioeconomic Status, Fundamental Cause Theory, and Prescription Opioid Use Behaviors: A Theoretical Examination.” *Sociological Spectrum* 40. doi: 10.1080/02732173.2019.1707138.

NIDA. 2021. “Naloxone Drug Facts.” *National Institute on Drug Abuse*. Retrieved October 28, 2021 (https://www.drugabuse.gov/publications/drugfacts/naloxone).

Parker, Caroline Mary, and Helena Hansen. 2021. “How Opioids Became ‘Safe’: Pharmaceutical Splitting and the Racial Politics of Opioid Safety.” *BioSocieties*. doi: 10.1057/s41292-021-00230-y.

Petersilia, Joan, and Jessica Snyder. 2013. *Looking Past the Hype: 10 Questions Everyone Should Ask About California’s Prison Realignment*. *SSRN Scholarly Paper*. 2254110. Rochester, NY: Social Science Research Network.

Phelan, Jo C., and Bruce G. Link. 2015. “Is Racism a Fundamental Cause of Inequalities in Health?” *Annual Review of Sociology* 41(1):311–30. doi: 10.1146/annurev-soc-073014-112305.

Phelan, Jo C., Bruce G. Link, and Parisa Tehranifar. 2010. “Social Conditions as Fundamental Causes of Health Inequalities: Theory, Evidence, and Policy Implications.” *Journal of Health and Social Behavior* 51(1_suppl):S28–40. doi: 10.1177/0022146510383498.

Pierce, Todd G. 1999. “Gen-X Junkie: Ethnographic Research with Young White Heroin Users in Washington, DC.” *Substance Use & Misuse* 34(14):2095–2114. doi: 10.3109/10826089909039440.

Pletcher, Mark J., Stefan G. Kertesz, Michael A. Kohn, and Ralph Gonzales. 2008. “Trends in Opioid Prescribing by Race/Ethnicity for Patients Seeking Care in US Emergency Departments.” *JAMA* 299(1):70–78. doi: 10.1001/jama.2007.64.

Rodda, Luke. 2021. *County of San Francsico, Chief Medical Examiner: Report on Accidental Overdose Deaths*.

Roehler, Douglas, Brooke Hoots, Emily Olsen, Mbabazi Kariisa, Nana Wilson Otoo, Rose Rudd, Desiree Mustaquim, Likang Xu, Lyna Schieber, NCIPC, and CDC. 2019. *Annual Surveillance Report Of Drug-Related Risks And Outcomes*.

Rudd, Rose A., Len J. Paulozzi, Michael J. Bauer, Richard W. Burleson, Rick E. Carlson, Dan Dao, James W. Davis, Jennifer Dudek, Beth Ann Eichler, Jessie C. Fernandes, Anna Fondario, Barbara Gabella, Beth Hume, Theron Huntamer, Mbabazi Kariisa, Thomas W. Largo, JoAnne Miles, Ashley Newmyer, Daniela Nitcheva, Beatriz E. Perez, Scott K. Proescholdbell, Jennifer C. Sabel, Jessica Skiba, Svetla Slavova, Kathy Stone, John M. Tharp, Tracy Wendling, Dagan Wright, and Anne M. Zehner. 2014. “Increases in Heroin Overdose Deaths — 28 States, 2010 to 2012.” *MMWR. Morbidity and Mortality Weekly Report* 63(39):849–54.

SAMHSA. 2020. “The Opioid Crisis and the Black/African American Population: An Urgent Issue | SAMHSA Publications and Digital Products.” Retrieved October 29, 2021 (https://store.samhsa.gov/product/The-Opioid-Crisis-and-the-Black-African-American-Population-An-Urgent-Issue/PEP20-05-02-001).

Samuel, Leah. 2017. “‘We Never Talked about It’: As Opioid Deaths Rise, Families of Color Stay Silent.” *STAT*, February 13.

Thadni, Tracey. 2021. “2020 Was S.F.’s Deadliest Year for Overdoses, by Far.” Retrieved May 30, 2022 (https://www.sfchronicle.com/local-politics/article/It-didn-t-have-to-happen-2020-was-15872937.php).

U.S. Department of Justice. 2020. “Drug Scheduling.” *DEA United States Drug Enforcement Administration*. Retrieved November 16, 2020 (https://www.dea.gov/drug-scheduling).

Van Zee, Art. 2009. “The Promotion and Marketing of OxyContin: Commercial Triumph, Public Health Tragedy.” *American Journal of Public Health* 99(2):221–27. doi: 10.2105/AJPH.2007.131714.

Weinlander, Matthew, and Debra A. Pinals. 2019. “Drug Dealer, MD: How Doctors Were Duped, Patients Got Hooked and Why It’s So Hard to Stop.” *Journal of the American Academy of Psychiatry and the Law* 47(1):125–27. doi: 10.29158/JAAPL.003827-19.

Young, Leonard D., Peter W. Kreiner, and Lee Panas. 2018. “Unsolicited Reporting to Prescribers of Opioid Analgesics by a State Prescription Drug Monitoring Program: An Observational Study with Matched Comparison Group.” *Pain Medicine* 19(7):1396–1407. doi: 10.1093/pm/pnx044.

Table 2

Regression analyses of County level patient prescription rates as predicted by racial composition controlling for age composition, gender composition, & median household income (Years 2008-2018)

	Equation 1	Equation 2	Equation 3	Equation 4	Equation 5	Equation 6
Year (2008-2018)	-16.74***	-9.809***	-9.762***	-13.87***	-0.0980	-2.896
	(1.202)	(2.652)	(2.668)	(2.948)	(2.672)	(2.980)
Q2 % White		5729.8	5819.0	7145.3	1720.2	2751.2
		(7479.9)	(7494.5)	(7444.3)	(7079.2)	(7095.2)
Q3 % White		41072.1***	41158.3***	49925.6***	44112.0***	49605.7***
		(7475.4)	(7489.6)	(7968.4)	(7079.3)	(7544.9)
Q4 % White		55726.1***	55813.2***	67109.1***	67959.2***	74784.3***
		(7345.7)	(7364.6)	(8187.0)	(7049.1)	(7760.4)
Year * Quintile 2 White		-2.851	-2.896	-3.558	-0.843	-1.358
		(3.715)	(3.723)	(3.698)	(3.516)	(3.524)
Year * Quintile 3 White		-20.36***	-20.40***	-24.77***	-21.86***	-24.60***
		(3.712)	(3.719)	(3.959)	(3.515)	(3.748)
Year * Quintile 4 White		-27.61***	-27.66***	-33.30***	-33.68***	-37.10***
		(3.648)	(3.658)	(4.071)	(3.501)	(3.859)
% Male			105.8			-92.44
			(608.5)			(528.7)
% Ages 60+				10.19**		6.364*
				(3.325)		(3.014)
Median Household Income					-0.00959***	-0.00939***
					(0.000916)	(0.000919)
_cons	34476.2***	20473.8***	20325.2***	28453.8***	1454.2	7010.4
	(2419.1)	(5343.6)	(5418.3)	(5912.5)	(5365.2)	(5989.0)
N	638	580	580	580	580	580

[1] Regression coefficients with standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3

Regression analyses of County level overdose death rates as predicted by racial composition controlling for age composition, gender composition, & median household income (Years 2008-2018)

	Equation 1	Equation 2	Equation 3	Equation 4	Equation 5	Equation 6	Equation 7
Year (2008–2018)	-0.118	-0.001	0.072	0.017	-0.022	0.057	0.010
	(0.0647)	(0.161)	(0.160)	(0.162)	(0.171)	(0.165)	(0.171)
Q2 % White		-99.63	-135.0	-65.20	-90.01	-120.9	-59.60
		(453.1)	(447.0)	(453.2)	(454.1)	(453.9)	(448.1)
Q3 % White		-347.2	-674.0	-325.9	-301.0	-319.7	-631.1
		(453.4)	(452.2)	(453.4)	(470.4)	(454.4)	(470.7)
Q4 % White		1698.7***	1213.1**	1727.1***	1756.6***	1777.2***	1221.5*
		(446.7)	(451.9)	(446.8)	(473.9)	(449.9)	(489.0)
Year * Quintile 2 White		0.050	0.0675	0.033	0.045	0.060	0.029
		(0.225)	(0.222)	(0.225)	(0.226)	(0.225)	(0.223)
Year * Quintile 3 White		0.174	0.336	0.163	0.151	0.160	0.314
		(0.225)	(0.224)	(0.225)	(0.234)	(0.226)	(0.234)
Year * Quintile 4 White		-0.841***	-0.601**	-0.855***	-0.870***	-0.880***	-0.606*
		(0.222)	(0.224)	(0.222)	(0.236)	(0.223)	(0.243)
Patient Prescription Crude Rate			0.00832***				0.009***
			(0.001)				(0.002)
% Male				34.25			37.52*
				(18.83)			(17.92)
% Ages 60+					0.049		0.107
					(0.137)		(0.130)
Median Household Income						-0.000	0.000
						(0.000)	(0.000)
_cons	244.3	7.193	-146.1	-48.35	48.84	-106.8	-45.71
	(130.2)	(325.2)	(322.4)	(326.4)	(344.7)	(332.4)	(344.3)
N	638	580	580	580	580	580	580

[1] Regression coefficients with standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$