“The Wall is Sweating”: Investigating Extreme Heat’s Impact in California State Prisons

By Kathryn Robinson

In the summer of 2020, Noire Wilson recalls what it was like being incarcerated at the San Quentin Rehabilitation Facility:

> When I originally got here, it was the beginning of COVID. So, it was locked down. And the problem with [being] locked down inside of a cell that's extremely hot is that […] you literally can barely go to sleep because literally, the wall is sweating; it's so hot […] you definitely feel your body going through something. You're constantly on a high heat feeling. You know, it was really hard to be able to get outside, of course, because it's so hot outside, and they wouldn't allow us to go outside. But it really didn't matter if you're outside or inside because even inside, it was like we were inside of an oven, just cooking. Just constantly cooking. (Abdala et al., 2024)

As Wilson describes, incarcerated individuals are often exposed to levels of heat that would be uncomfortable for many. Research suggests that people’s cognitive performance starts to dip at just 79°F (Lan et al., 2021). California carceral facilities range in the level of extreme heat they experience and how often it is experienced. San Quentin, where Noire Wilson is incarcerated, only reached above 90°F one time in 2020. Compare this to 2023. Some prisons such as Ironwood, Calipatria, and Centinela State Prisons were above 90°F for more than 150 days and over 105°F for 50-60 days (Centers for Disease Control and Prevention). These three prisons alone are home to over 9,000 incarcerated people. Pairing this heat with little to no AC, ventilation, or adequate shade and the conditions become excruciating (Rainey, 2023). My research aims to deepen our understanding of how impactful extreme heat is on incarcerated individuals’ cognition and behaviors. Broadly, what is the impact on incarcerated behavior when

they are more often in extreme heat? Specifically, how does being more often exposed to extreme heat impact the number of incident reports in California state prisons? To answer this question, I compare the California Department of Corrections and Rehabilitation (CDCR) 2021-2024 COMPSTAT Incident Reports between 10 California prisons most vulnerable to extreme heat[1] versus 10 prisons not as commonly exposed to extreme heat[2].

Context and Significance

Definitions

I rely on the Historical Heat & Health Burden Percentile Rank by the Center for Disease Control and Prevention (CDC) to define which prisons are more vulnerable to extreme heat. The CDC found the average number of extreme heat days, meaning temperatures above the 95th percentile, in 2018-2022 relative to the aggregate temperature data from 1991 to 2020. The CDC found the health burden percentile using data from the number of heat-related illnesses relative to the number of emergency service requests to the National Emergency Medical Services Information System (NEMIS) in 2020-2022. In my research, more vulnerable extreme heat prisons are defined as extreme heat days averaging above the 90th percentile on the Historical Heat and Health Burden Percentile Rank (Centers for Disease Control and Prevention). The control group of prisons, or less vulnerable to extreme heat prisons, are lower than the 70th percentile in the Historical Heat and Health Burden Percentile Rank. Geographically, prisons in

[1] The prisons more vulnerable to extreme heat, from highest to lowest respectively, are Los Angeles County (LAC); Mule Creek State Prison (MCSP); Calipatria State Prison (CAL); California State Prison, Centinela (CEN); Ironwood State Prison (ISP); Sierra Conservation Center (SCC); High Desert State Prison (HDSP); California Correctional Institution (CCI); California State Prison, Sacramento (SAC); and California State Prison, Folsom State Prison (FSP).

[2] The prisons less vulnerable to extreme heat, from lowest to highest respectively, are San Quentin Rehabilitation Center (SQ); California State Prison, Solano (SOL); California Institution for Men (CIM); Kern Valley State Prison (KVSP); North Kern Valley State Prison (NKSP); Correctional Training Facility (CTF); Salinas Valley State Prison (SVSP); Wasco State Prison (WSP); Avenal State Prison (ASP); and Pleasant Valley State Prison (PVSP).

the desert or the Central Valley of California tend to have a higher heat rank than the ones near the coast.

In California prisons, incident reports are documented by CDCR and include a wide range of categories. The ones I will focus on are mental health incidents, assault, battery, and death in prison. These reports are often broken down into subcategories such as the death report category including medical, suicide, expected, or unexpected. Another example where there are subcategories is for assault and battery. Generally, this category consists of four subcategories including assault on a peace officer or non-prisoner, assault on an inmate, battery on a peace officer or non-prisoner, and battery on an inmate (Office of Research). For my research, I add the subcategories together to make up a main category like "death" as one category and "assault and battery" as another.

Prison Reform Background

Two events unrelated to climate change, but impactful for state prisons, were the nationwide protests for decarceration and criminal justice reform as well as the COVID-19 pandemic in 2020 and 2021. California United for a Responsible Budget (CURB) urged Governor Gavin Newsom to close 10 prisons by 2025 highlighting the need to address poor health outcomes for incarcerated people and invest in prison communities impacted by COVID-19 (Uyeda, 2023). CDCR responded to COVID-19 slowly and with several missteps.[3] The CDCR's response brought to light the department's unpreparedness for emergencies, which is especially worrying as climate hazards continue to grow. Additionally, in *Brown v. Plata* in 2011, the US Supreme Court upheld the decision from the 3-judge panel of the California

[3] One example was in June 2020. The CDCR transferred 121 individuals infected with COVID-19 to San Quentin Rehabilitation Center (SQ). This move triggered a widespread outbreak at the facility, infecting 75% of the inmate population. The outbreak was the largest in any U.S. prison. The impact extended beyond the prison walls, with half of the beds in nearby hospitals being occupied by patients from SQ (Abdala et al., 2024).

Supreme Court that overcrowding in prisons was the main contributing factor to poor medical care and ordered Brown to decrease the population densities to under 137.5% design capacity by 2013 (Abdala et al., 2024). An equally impactful and ongoing case is *Plata v. Newsom* filed in 2001 wherein the court found the medical care in California prisons unconstitutional and largely emphasized the poor care for COVID-19. This is an ongoing case in which the California Supreme Court has still not ruled if the changes made were sufficient enough, but may lead to the appointment of a receivership. A receiver would be a third party tasked with improving the quality of medical care in California prisons and one was appointed in *Brown v. Plata* in 2006 (*Case: Plata v. Newsom)*.

More recently, Newsom announced his bold prison reform plan called the "California Model," whose goal is to turn the California prison system to be modeled more like Nordic-style prisons as well as the closing of three prisons. Much of the reforms from the California Model, such as the San Quentin transformation, focus on building new facilities with new programs. These plans fail to consider climate change-specific solutions like better solutions to extreme heat, flooding, or wildfires (Uyeda, 2023). However, decreasing overcrowding in California prisons may indirectly improve CDCR's ability to mitigate climate change, but this is not a quick or direct solution. Many people working within carceral institutions believe that solving overcrowding is the solution to climate vulnerability, however, the issue of extreme heat and weather conditions in prisons is already a frequent occurrence. Incarcerated people cannot afford to wait for the slow release of parolees and shutting down of prisons. Incarcerated individuals deserve humane living conditions, which requires the CDCR to consider research and news advocating for more urgent, climate-change-specific actions.

Heat in California Prisons Background

In August 2020, the same summer Noire Wilson talked about, Death Valley reached 130 degrees, the hottest temperature ever reliably recorded on Earth. Also in the summer of 2020, researchers found heatwaves in California to be getting longer, hotter, and occurring more frequently in the last 70 years (Patel, 2020). As awareness of climate change has grown, so too do the calls for justice. Prisons are uniquely vulnerable to the effects of climate change due to overcrowding, location[4], poor infrastructure, a large elderly population, and many people taking heat-sensitive medications (Smith, 2024). In 2024 Abdala et al. found that 16% of the 92,606 people incarcerated in California are over 55 years old. One survey found that 36% of incarcerated individuals in California prisons were taking heat-sensitive medicines which are often psychotropic medicines that affect the person's ability to regulate their body temperature (Abdala et al., 2024). These key traits in California prisons closely align with the California Governor's Office of Planning and Research (OPR) definition of climate vulnerability. Key ideas like increased risk of exposure, increased sensitivity, and fewer resources to cope, adapt, or recover from climate change events are all present in prisons (Office of Research, 2024).

In 2012 and 2016, to support climate-vulnerable communities Governor Brown signed SB 535 and AB 1550 respectively, which allocate 25% of the state's profit from Cap-and-Trade Program[5] activities to communities disproportionately affected by climate change. However,

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[4] Prisons are often built in hotter, remote, and rural areas of California. This is partly due to the "Not in My Backyard" attitude in coastal-metropolitan and urban areas where people do not want to constantly be reminded or live close to a large population of incarcerated individuals. Another very different reason is that residents in California's Central Valley advocate for correctional institutions in their own neighborhoods hoping that there will be an increase in economic growth and political importance to their small town (Stabile, 2018).

[5] The Program applies to emissions that cover approximately 80 percent of the State's GreenHouse Gas (GHG) emissions. California Air Resource Board (CARB) creates allowances equal to the total amount of permissible emissions (i.e., the "cap"). One allowance equals one metric ton of carbon dioxide equivalent emissions (using the 100-year global warming potential). Each year, fewer allowances are created and the annual cap declines. An increasing annual auction reserve (or floor) price for allowances and the reduction in annual allowances creates a

prison facilities are excluded from this. This is not the only environmental justice initiative from which state prisons are left out. For example, the CalEnviroScreen that reports air pollution levels does not report on air quality in California prisons (Abdala et al., 2024). Earlier this year, California became the third state to approve a workplace heat rule requiring all employers to provide cooling areas and monitor workers for signs of heat illness when it is 82 degrees or higher. This rule explicitly excludes state prisons and local jails (Kuang, 2024). As previously mentioned, prisons are extremely vulnerable to the effects of climate change, yet they are continuously excluded from measures of climate and environmental justice.

The CDCR and California Correctional Health Care Services (CCHCS) have a Heat Illness Prevention Plan to try to ensure the safety of incarcerated individuals during excessive heat events at prisons. All 32 prisons in California have a Heat Plan Coordinator who is responsible for deciding the course of action based on monitoring of temperatures, heat-related illnesses, and other critical data. The Heat Plan Coordinator ultimately has control over interpreting data and taking action which means this plan may differ depending on the prison. There are few options available to the coordinators such as increasing access to coolers, fans, water, ice, and in rare cases finding alternative housing. The effectiveness of these actions is unclear, as there is not much difference as the heat rises. In other words, there is only so much the Heat Plan Coordinators can do as temperatures increase. The CDCR's current approach does not do enough to combat extreme heat especially when considering all the potential effects of extreme heat demonstrated in research literature.

A Review of Heat's Impact Inside and Outside of Prisons

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steady and sustained carbon price signal to prompt action to reduce GHG emissions (Office of Research, 2024).

Noire Wilson described a constant “high heat feeling” (Abdala et al., 2024). Extreme heat often has this effect on people. As previously mentioned, a study by Lan et al., supported the idea that people’s cognitive abilities start to decline at a mere 79°F (2021). Heat has been shown to have a variety of effects from changes in mood to a decline in cognition, and even promoting violent or aggressive behaviors (Tuholske et al., 2024). Research from Tiihonen et al., suggests that the serotonergic system in people’s brains is changed with hotter temperatures, which leads to aggression, impulsivity, and irritability (2017). There is extensive existing literature focusing on a variety of heat-related effects. For this review, I will focus on research that supports heat affecting aggression, mental health, death, and prison populations.

The link between aggression and heat is well documented through increased crime statistics during heat waves and hotter months. For example, in Finland from 1996 to 2013, Tiihonen et al., found that average temperature differences accounted for 10% of the variance in violent crime rates (2017). Two different studies looked into the theory and history behind heat and aggression. These papers both supported the idea that although heat may not directly cause aggression it serves as a multiplier. In other words, if someone is already in a bad mood, irritated, or stressed, heat may magnify these existing states which can then lead to aggression and sometimes violence (Anderson and Anderson, 1998 & Anderson et al., 2000).

Heat’s effect on mental health has also been supported through various data. Some have drawn connections between days of extreme heat and increased emergency department visits for mental health by looking at US statistics from 2010-2019 (Nori-Sarma et al., 2022). Another study found that suicide rates increased in Mexico, from 1990 to 2010, and in the United States, from 1968 to 2004, during higher temperatures (Burke et al., 2018). Others have found evidence to support the idea of heat acting as a trigger for an episode of certain mood disorders such as

schizophrenia (Crank et al., 2023). Medications related to mental health treatment and disorders are often heat-sensitive as well (Abdala et al., 2024).

In 1995, Chicago, Illinois had a heat wave that led to almost 700 extra deaths in 50 days. The researchers specifically were looking at the causal relationship between heat and death. They found that older adults, people with neurological disorders, and those with existing health conditions were more susceptible to health effects from extreme temperatures than the greater subpopulation (Kaiser et al., 2007). More recently, a heat wave in France led researchers to the same correlation that elderly populations, age 65 and above, were at a higher risk from the heat health effects. Another finding from these researchers was that people who were socially isolated, bedbound, or lacked mobility had an added layer of risk during extreme heat (Vandentorren et al., 2006). These are just two examples of a widely agreed upon assertion that extreme heat can cause death in some cases and certain pre-existing factors may exacerbate the health effects of heat.

The unique aspect of my research is heat's effect, particularly on incarcerated populations in California. Others have done extreme heat studies with incarcerated populations such as Cloud et al. in Louisiana (2023). This longitudinal study found that between 2015 and 2017 in 6 different prisons, the daily suicide incidents increased by 29% when the heat index reached 80-89°F (Cloud et al., 2023). Research from Skarha et al. focused on the entire US prison system stating that in 2015, 22 states did not have any policy about temperature regulation (2020). These researchers pointed out that at least 14 deaths in the Texas prison system were attributed to a lack of indoor temperature regulation and pointed out extreme heat conditions in Louisiana after Hurricane Katrina. They also found that between 1980 and 2019 there have been over 1,200

cases in the Westlaw database relating to the 8th Amendment about cruel and unusual punishment and extreme temperatures in prisons (Skarha et al., 2020).

There has been research supporting the idea that people in prison are more vulnerable to the effects of climate change due to heat-sensitive medications, an aging population, poor cooling infrastructure, and the location of prisons (Smith, 2024 & Skarha et al., 2020). Although similar research to mine has been done in other states, there is missing literature on California-specific extreme heat and incarcerated behavior. Abdala et al. found that 16% of incarcerated people are over 55 years old and 29% received mental health treatment (2024). Knowing the existing research on how medications and mental health can be affected by extreme heat, it is easy to see how this is very applicable to the populations in California prisons. My research connects the gap between incarcerated people in California and the well-documented potential cognitive and behavioral effects of extreme heat. This existing literature is the reason my research will focus on prisons with more extreme heat and incident reports relating to assault, battery, mental health, and death.

Theory and Hypothesis

My research focuses on the empirical and extensive framework that the literature above highlights. This includes the link between extreme heat and behavior changes, cognitive functioning, and mental health. This link is a main idea in studies like Tiihonen et al. and Anderson et al. which show that heat amplifies aggression, especially in a stressful environment (2017 and 1998). None of the studies show a causal effect of violent behavior but show a correlational relationship between aggression, mental health issues, and violence being exacerbated by pre-existing stressors or psychological disorders. This literature framework is important to incarcerated people due to overcrowding and limited to no AC which can both

increase stressors or other effects of extreme heat. Furthermore, Nori-Sarma et al. highlighted the increased risk of certain demographics such as the elderly and those with existing conditions (2022). Work by Vandentorren et al. supports this conclusion (2006). Additionally, findings from Abdala et al. suggest these demographics are overrepresented in California prisons (2024). Once again, this supports the idea that incarcerated communities are at a greater vulnerability to the effects of extreme heat.

My research builds on this evidence and explores the specific relationship between extreme heat and incarcerated populations' behavior in California. Based on the empirical framework laid out above, the expected outcome of my research is that prisons more vulnerable to extreme heat (those ranking above the 90th percentile according to the CDC's Historical Heat & Health Burden Percentile Rank) will report higher incidents of aggression, mental health incidents, and death. This is consistent with the findings of Cloud et al., who observed increased suicide rates in Louisiana prisons during periods of high heat (2023). Similarly, Skarha et al. found a correlation between heat-related deaths in prisons across the U.S (2020). My research aims to establish a similar correlation between extreme heat and negative behavioral outcomes in the California prison system. Conceptually, I hypothesize that prisons that are more exposed to extreme heat will have more negative reports, relating to violence, mental health, and even death. Operationally, I hypothesize that if a prison is more exposed to extreme heat, then it will have a higher number of incident reports compared to a prison of similar size, density, and level of security that is less vulnerable to extreme heat.

Research Design and Methods

My independent variable is a binary categorical variable. The two categories are: more vulnerable and less vulnerable. As previously defined, more vulnerable prisons are specifically in

the 90th percentile or greater and the control group of prisons, or less vulnerable, are lower than the 70th percentile according to the CDC's Historical Heat and Health Burden Index (Centers for Disease Control and Prevention). My dependent variable is the behavior of prisoners, which is operationalized through the number of incident reports and anchored on the population size of each prison. As previously mentioned, I will use the total number of reports, use of force, assault and battery, mental health, and death. For my dependent variable, I will look at the most recent COMPSTAT Incident Report released by CDCR, which has all California prisons from June 2021- June 2024 (Office of Research).

Three control variables are the population size, population density, and level of security and housing at the prison. Population size and density have the potential to confound my project's data as it may be the case that prisons with larger size and higher density will have a higher number of incident reports because there are simply more people. The first two variables, size, and density, can be found on the CDCR's Office of Research Total Population page. The density percentage in prisons is calculated by dividing the number of people the prison was built for by the number of people currently in the prison (Population Reports). The level of security of each prison ranges from I-IV and is on the Department Operations Manual (DOM) of the CDCR's website (62010.6 institution classification levels). The level of security is assigned based on the facts from someone's case factors and threats to public safety. Most prisons have mixed security levels (62010.6 institution classification levels). Similar to the reason to control for size and density, I will control for the level of security because I do not want more incident reports to be mainly due to the fact there is a higher level of security.

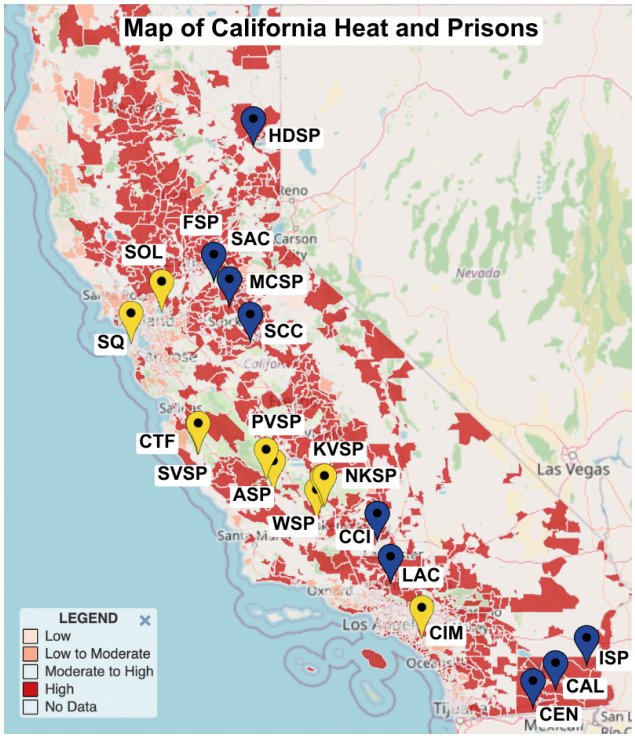
I will control for these factors by choosing control prisons that have roughly the same density and security level as the more vulnerable prisons. Additionally, I will divide the number

of reports by population size to standardize the number of reports per person. Comparing the extreme-heat-vulnerable prisons to the non-extreme-heat-vulnerable prisons of similar size and type, will highlight the differences due to extreme heat and not due to size, density, or level. In other words, because the two population groups will be relatively similar, except in exposure to extreme heat, any differences between the two population groups' incident report numbers would be mostly attributed to the prison's difference in extreme heat exposure.

My unit of analysis is California state prisons. As shown in Figure 1, this research will be looking at 20 total facilities with 10 being institutions exposed to extreme heat more than the other 10 selected prisons. As previously mentioned, a geographic trend is that the less vulnerable prisons are near coastal areas whereas the more vulnerable are in deserts and the Central Valley. I will examine multiple cases, meaning several prisons with several types of incident reports data, from 2021-2024. The sample size, or n-size, is 20 California state prisons. The total population size of all 20 prisons is 62,141 people which makes up about ⅔ of the total prison population in California. Given the sample size, my analysis will be a comparative case study or small-n analysis. My research's temporal scope covers data from June 2021 to June 2024. My geographical scope is limited to California state borders. The correlational test I will run is a point-biserial correlation test for one binary variable and one continuous variable. My independent variable is a binary category: more vulnerable or less vulnerable. My dependent variable, the number of incident reports, is a continuous variable.

Figure 1

Map of California Heat and Prisons



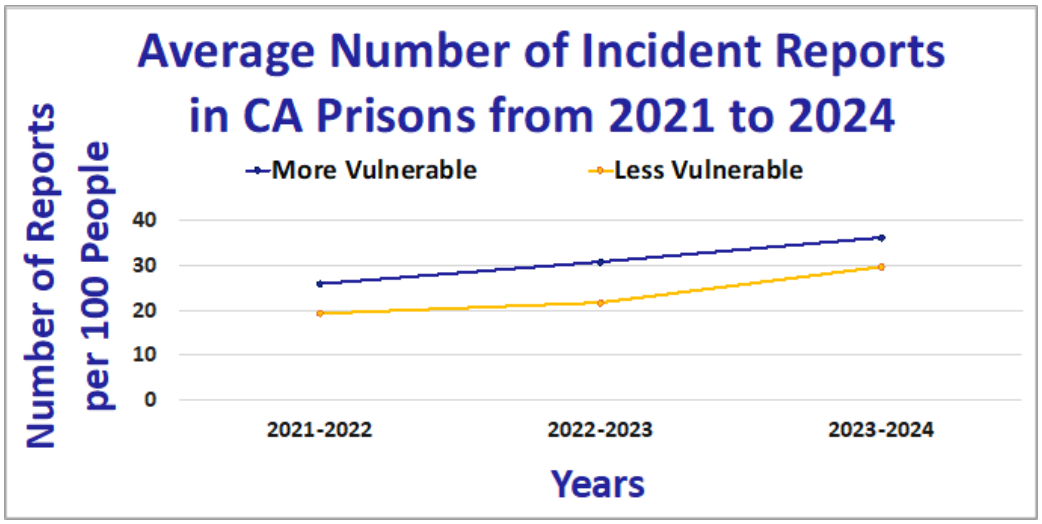
Note. Map of California with the Historical Heat & Health Burden Percentile Rank More vulnerable is in blue and less vulnerable is marked in gold. Data Source: CDC (https://ephtracking.cdc.gov/DataExplorer) and CDCR (Map of California's Correctional and Rehabilitation Institutions).

Results

As shown in Figure 2, California prisons more vulnerable to extreme heat consistently had a higher number of total incident reports per 100 people from July 2021 to July 2024. After running a point biserial test, the coefficient for the total number of reports in more versus less vulnerable prisons was r = 0.19. Although this coefficient is of low statistical significance, it still shows a positive effect between my two variables. This supports my hypothesis that prisons in the more vulnerable to extreme heat category would have a higher number of total incident reports than the control group.

Figure 2

Average Number of Incident Reports in California Prisons from 2021 to 2024

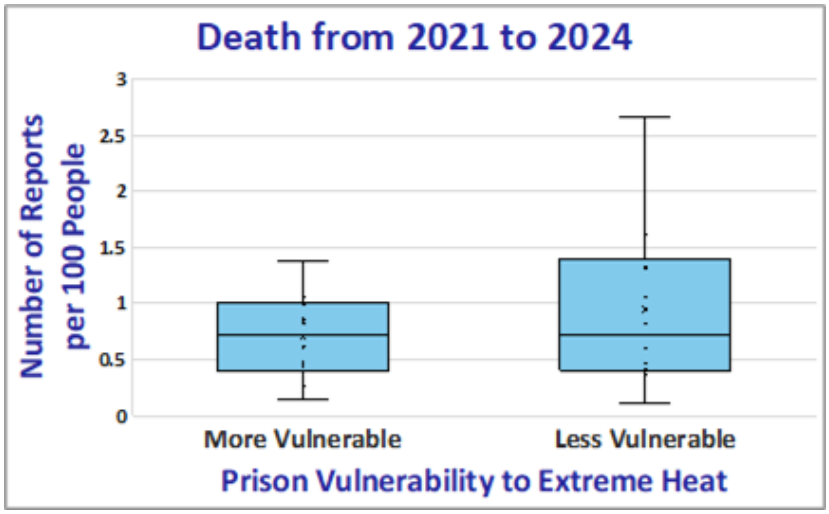


Note. Data Source: CDC (Centers for Disease Control and Prevention) and CDCR (Office of Research, 2024)

Figures 3 and 4 break down California prisons' incident reports per 100 people from July 2021 to July 2024 based on category. Total incident reports are included in Figure 4, but the results of this category are in the discussion of Figure 1 above. The categories of incident reports included in my research are death, use of force, mental health, and assault and battery. After running the point biserial test for reported death in more versus less vulnerable prisons the coefficient was r = -0.29. This coefficient depicts a normal strength negative correlation. This is the one category that does not support my hypothesis. I predicted that more vulnerable prisons would have more incident reports, but the data shows less vulnerable prisons had a greater number of deaths from 2021 to 2024 (Figure 3).

Figure 3

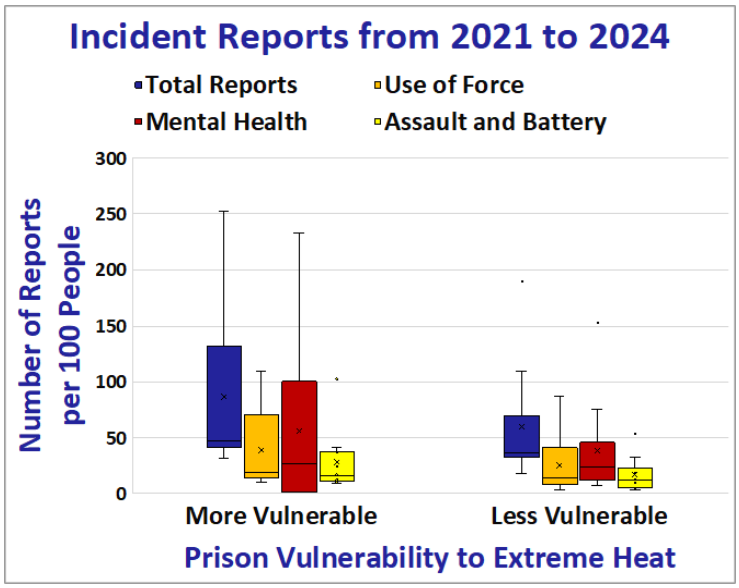
Death from 2021 to 2024



Note. Data Source: CDC (Centers for Disease Control and Prevention) and CDCR (Office of Research, 2024)

Figure 4

Incident Reports from 2021 to 2024



Note. Data Source: CDC (Centers for Disease Control and Prevention) and CDCR (Office of Research, 2024)

In Figure 4, incident report categories include use of force, mental health, and assault and battery. After running a point biserial test for each category, respectively, the coefficients were r = 0.24, r = 0.16, and r = 0.25. These three coefficients show statistical support for my hypothesis. Although the number of mental health reports was much greater per 100 people in more vulnerable prisons, the correlation strength was the lowest of the three categories. This result shows that there was more variability in mental health reports in more vulnerable prisons. This result also shows the effect the outlier (Salinas Valley State Prison) from less vulnerable prison group has on the data. Both use of force and assault and battery in more vulnerable prisons had a stronger statistical correlation strength than mental health reports. The coefficients from these two categories show a normal strength correlation that more vulnerable prisons had more reports in use of force and assault and battery (Figure 4).

In summary, the total number of incident reports per 100 people from July 2021 to July 2024 supports my hypothesis that California prisons more vulnerable to extreme heat have a higher number of incident reports. On average, more vulnerable prisons had about 86 reports per 100 people whereas less vulnerable prisons had about 63 reports per 100 people. The total number of reports was a low strength correlation, but when broken down by category, use of force and assault and battery have a stronger correlation. Mental health incident reports had the lowest correlation strength while supporting my hypothesis. Reported deaths in prisons did not support my hypothesis, instead showing that less vulnerable prisons had a higher number of deaths from 2021 to 2024.

Discussion and Implications

My work aimed to answer the research question: Does extreme heat impact behavior in California prisons, specifically does heat vulnerability impact the number of incident reports in

prisons? Based on the existing literature, I hypothesize that California prisons more vulnerable to extreme heat would have a higher total number of incident reports in categories relating to death, use of force, mental health, assault, and battery than less vulnerable prisons. The conclusions of the different incident report categories suggest a more nuanced picture. Overall, the results from my data supported my hypothesis, with one contradiction, which provides a complex look into the relationship between extreme heat and prison behavior.

For the categories use of force and assault and battery, the point biserial coefficients were $r = 0.24$ and $r = 0.25$, respectively. This shows a moderate positive correlation between more vulnerable prisons and the number of reports, supporting my hypothesis. These findings are consistent with the literature on aggression and heat, such as Anderson and Anderson, who suggested that heat acts as an amplifier of aggression in stressful environments (1998). Use of force is a category that describes actions taken by the officers whereas assault and battery describes incarcerated people's actions. In other words, these findings suggest that extreme heat impacts both prison officers' and incarcerated peoples' behaviors, showing a relatively strong correlation between heat and aggression in California prisons.

Similarly, mental health incident reports show a positive but weaker correlation ($r = 0.16$). While this result supports my hypothesis, it suggests other factors besides heat may be at play when looking at the mental health reports in more vulnerable prisons. One possible explanation for the weaker correlation strength could be due to specific prison conditions. For example, Salinas Valley State Prison, an outlier from the less vulnerable group, might have unique prison conditions contributing to higher reports across categories. Nori-Sarma et al. noted similar conclusions that the effects of heat can exacerbate pre-existing mental health conditions, but local differences may have the ultimate influence (2022).

The results of the reported death category contradicted my hypothesis. The point biserial correlation coefficient was r = -0.29 which indicates that less heat-vulnerable prisons reported more deaths than more vulnerable ones from 2021 to 2024. This finding from my research is in direct opposition to existing literature. An example of this literature is from Kaiser et al., which links extreme heat to higher mortality rates, particularly among vulnerable populations (2007). A possible explanation for why my results did not correlate with the trend could be the presence of better heat-mitigation measures in more vulnerable prisons, such as enhanced medical protocols or cooling infrastructure. Another possible explanation is that the prisons in the more vulnerable category had demographics that were less at risk such as less elderly or already sick incarcerated people.

Although the results are mixed, they largely support my hypothesis while highlighting the complex relationship between heat and behavior in California carceral institutions. While aggressive behaviors and mental health incident reports were greater in more vulnerable to heat prisons, the unexpected relationship between death and heat suggests that mortality may have been more impacted by other factors. Mortality should be studied more in prisons with hotter temperatures or more of a difference in temperatures to capture the difference heat has on death in prisons. The correlation between heat and mental health, although statistically not as strong, still emphasizes the need for higher quality mental health care in California carceral institutions, especially during periods of extreme heat. Other ideas to improve include providing additional visits to cells by medical staff, closer monitoring of incarcerated people on heat-sensitive medications, and creating cooled areas for individuals receiving mental health treatment specifically. The positive correlation between heat vulnerability and aggressive incident reports highlights the need for better heat mitigation in more climate-vulnerable prisons. The CDCR

must prioritize investments in cooling systems and the adoption of minimum heat rules in working environments which could potentially lead to decreases in violence in prisons as supported by this research.

Limitations and Extensions

One of the key limitations in my research is the choice to use a historic heat measure rather than precise temperature thresholds, such as those suggested by the CDC (e.g., 90°F), or predicted heat measures like Abdala et al. (2024). By relying on historic heat data, the variability I found could have shown a different relationship if I had used a different measure for extreme heat and incident report categories in prisons. The historic heat measure does not account for a specific number of days of extreme heat, which could have had a more immediate and pronounced effect on prison behavior. Using specific temperature thresholds per day might have provided more direct correlational data, allowing a clearer understanding of how heat impacts behavior and health in prisons. However, I was unable to find specific temperature data breakdown by month and this would have been difficult to chart incident reports per month. My research focused more on the historical relationship, but future research could focus on the negative effects correlated with exact thresholds or predicted temperatures.

Another limitation in my research is the geographic scope of California. Half of the 32 California prisons are built in the Central Valley which has consistently hotter temperatures than the rest of the state (Stabile, 2018). This trend of building prisons in remote and rural areas made it difficult to differentiate between facilities based on heat exposure, as most are subject to similar climate conditions with the “less vulnerable” prison still having a decent amount of extreme heat events. Although there is a way to differentiate heat using certain measures, such as the historic heat measure I used, the similarity in heat exposure might limit the variability needed

to draw stronger conclusions about the impact of extreme heat on prison incidents. Looking at the whole country instead of just California may offer greater temperature differences and the effects could be seen more clearly. This would offer a more narrow lens that focuses solely on climate differences rather than comparing prisons with not as sharp of a difference in the case of California.

While my research focused on extreme heat, future directions of study should expand the focus to include other climate change effects that will be increasingly common in California such as flooding, wildfires, or poor air quality. These climate events could have similarly negative effects on the physical and mental health of incarcerated populations. These events may also have a feedback loop and increase in frequency once started. For example, increases in extreme heat events may lead to more wildfires. Fires near prisons may lead to forced evacuation or strongly affect air quality. Future research should explore other areas of climate change like its potential effects and other effects that are a real and imminent threat to prisons.

Conclusion

My research explores the relationship between extreme heat and incident reports in California prisons, focusing on July 2021 and July 2024. My findings supported my hypothesis that prisons more vulnerable to heat have a higher number of total incident reports per 100 people, particularly in categories such as use of force, mental health crises, and assaults and batteries. Although the strength of the correlation was limited, the results demonstrated that more heat-vulnerable prisons have a higher number of incident reports. One of my findings, that less vulnerable prisons reported a higher number of deaths during this period suggests that factors other than heat. Examples of other factors include healthcare resources or prison conditions, which may have more influence on mortality rates in California prisons. These findings have a

broader call to action for policymakers and government officials to stop leaving prisons out of climate adaptation and mitigation strategies. As climate change continues to increase extreme heat, prisons lack adequate cooling infrastructure and are home to vulnerable populations. Climate-specific policies such as a minimum heat standard and increasing accessibility to medical care during extreme heat could greatly help a vulnerable population to the effects of climate change.

In summary, this project highlights an important yet often overlooked issue. It calls for prisons to be included in climate actions, specifically ones that address extreme heat. Extreme heat is a growing public health concern across the state and nation. Climate policy and action must ensure no section of society is excluded, especially the incarcerated who are particularly vulnerable. To ensure climate justice, California policymakers must implement ideas that not only address immediate threats from rising temperatures, but also ensure the long-term mental and physical well-being of incarcerated populations in an increasingly hotter state. Broadly, this project is part of a larger movement to reimagine and better our criminal justice system which includes anti-racist policing, fairness in sentencing, and the more humane treatment of people currently incarcerated in both California and across the United States of America.

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