Excessive Heat and Correctional Officer Departures: Evidence from Texas

Benjamin Goehring* Jacob Harris†

June 2, 2025‡

Abstract

Correctional work is difficult and dangerous. It is also hot. Most U.S. states' prison systems lack universal air-conditioning, resulting in sweltering conditions for incarcerated people and correctional employees. We examine the effect of excessive heat on correctional officer departures using personnel records of 40,335 correctional staff employed by the Texas Department of Criminal Justice between 2010 and 2023. We show that before the onset of the COVID-19 pandemic the odds of departing the correctional workforce were 20% higher for employees working in a prison without air-conditioning. However, we do not find that correctional officers were more likely to depart in the summer months or that the court-ordered installation of air-conditioning in Texas' Pack Unit in 2018 led to reduced departures. Overall, our findings suggest that excessive heat correlates with increased departures, but air-conditioning does not fully address the challenging conditions faced by correctional officers.

*Ph.D. student, Department of Political Science and Ford School of Public Policy, University of Michigan. Contact: bengoehr@umich.edu

†Ph.D. student, Department of Government, Cornell University. Contact: jh2689@cornell.edu

‡Authorship is listed alphabetically. Both authors contributed equally. We thank Christian Fong and Charles Shipan for helpful comments. We are responsible for all errors.

Prisons and jails across the U.S. are contending with an understaffing crisis. Hiring and retaining correctional officers has long been difficult (Lambert, 2001), but rising incarceration rates and the COVID-19 pandemic have brought many prison systems to the tipping point. Between 2019 and 2022, the number of state-employed correctional officers declined by 10%, with states like Arkansas and Georgia experiencing declines of 20% and 29%, respectively (Heffernan and Li, 2024). In some states, vacancy rates among correctional staff are as high as 50% despite widespread initiatives to attract new hires (Lieb, 2023). Reduced staffing makes prisons more dangerous for both employees and incarcerated people. Numerous accounts document how understaffing is associated with increased violence, staff assaults, prolonged lockdowns, and poor health outcomes for incarcerated people (Heffernan and Li, 2024; Lambert, 2001; Minor et al., 2011; Nam-Sonenstein and Sanders, 2024).

Most existing research emphasizes how psychological factors like stress, burnout, and organizational support are associated with correctional officer exits (Cullen et al., 1985; Finney et al., 2013; Lambert, 2001; Schwartz et al., 2024). These studies generally rely on cross-sectional surveys administered to relatively small samples of correctional staff. (Ferdik and Hills, 2018; Griffin, Hogan and Lambert, 2014; Lambert and Hogan, 2009; Minor et al., 2011). While informative, these studies largely take it as given that correctional work is difficult and dangerous. Small sample sizes and cross-sectional data make it difficult to examine how variation in the conditions faced by correctional officers contribute to understaffing. Even when data is observed over time (Schwartz et al., 2024), survey-based measures that rely on officers' subjective perceptions are not well-equipped to assess how institutional characteristics like frequent violence, squalid conditions, high inmate-to-staff ratios, and high security levels influence employees' likelihood of exiting.

Using new longitudinal personnel records of correctional officers, we evaluate how excessive heat, an increasingly relevant source of poor working conditions in U.S. prisons, influences correctional officer departures. Very few states' prison systems have universal air-conditioning. As a result, many prisons are sweltering in the summer months, with some reaching indoor temperatures of over 130 degrees (Salhotra and Melhado, 2024). The poor conditions brought about by excessive heat have spurred numerous lawsuits and instigated

a growing body of research documenting the negative effects of heat on rates of violence (Mukherjee and Sanders, 2021) and incarcerated individuals' health (Skarha et al., 2022, 2023). Yet, despite numerous anecdotal accounts of heat's impact on correctional staff and concerns over prison understaffing, we are the first to examine how excessive heat affects correctional officer exits.

We evaluate the impact of excessive heat on correctional officers employed by the Texas Department of Criminal Justice (TDCJ). Texas' state prison system is a particularly good setting for evaluating heat's role in fostering poor working conditions for correctional officers. The TDCJ operates the largest state prison system in the country. In December 2024, the agency had over 135,000 individuals in its custody across nearly 100 facilities. Despite Texas prisons being exposed to high levels of extreme heat in the summer months (Tuholske et al., 2024), only 31 of the TDCJ's 100 facilities were fully air-conditioned as of August 2023. Fourteen facilities lacked any air-conditioning in their housing areas, with the remaining prisons having partial, often minimal, coverage. As a result, conditions within many TDCJ prisons are brutal in the summer months. A federal judge in 2025 called the lack of air-conditioning in TDCJ prisons "plainly unconstitutional," while a different federal judge wrote in a 2018 injunction that incarcerated people in Texas "face a substantial risk of serious harm from the sweltering Texas heat" (McCullough, 2017; Salhotra, 2025). Union officials in the state have called excessively hot Texas prisons "death traps" and likened working in units without air-conditioning to "going up and down stairs at a football stadium in the heat of the day, while wearing a coat" (Dang, 2022; Martin, 2013).

We test whether these conditions lead employees to depart the TDCJ workforce using individual-level personnel data and facility-level air-conditioning data. The personnel records consist of monthly snapshots of all TDCJ staff employed in security positions across the state from January 2010 to January 2023. The records are rich, noting employees' names, race, sex, ages, job titles, salaries, hire dates, and employing facilities. In order to determine whether correctional officers work in air-conditioned facilities, we rely on data from the Texas Prisons Community Advocates (TPCA), a nonprofit advocacy organization. The facility-level air-conditioning data, which the TPCA received via public-records requests to the TDCJ, notes

whether each prison's housing areas have full, partial, or no air-conditioning.[1]

We use a series of tests to examine the relationship between excessive heat and correctional officer departures. First, controlling for a variety of employee-, facility-, and state-level covariates, we show that before the onset of COVID-19 the odds of exiting the TDCJ workforce in a given month were, on average, 20% higher for correctional officers in prisons with no air-conditioning compared to those working in facilities with full air-conditioning. In a series of robustness checks, we show that this relationship is isolated to those employees most affected by the heat — namely, new hires and non-supervisors. However, the correlation between departing and working in a facility without air-conditioning disappears for the period from March 2020 through January 2023, suggesting that the COVID-19 pandemic drowned out the benefits of working in an air-conditioned facility. We also test whether temperature moderates the relationship between working in a facility without air-conditioning and the probability of departing. In contrast to some anecdotal accounts of higher turnover in the summer months, we do not find that higher temperatures increase the probability of departing in facilities without air-conditioning. Finally, we also do not find that departures decreased in the Pack Unit, which was the subject of a 4-year court battle over excessive heat, following the installation of air-conditioning in the prison in 2018.

Overall, our results paint a mixed picture of how the poor working conditions resulting from excessive heat influence correctional officer departures. The correlational findings for the pre-COVID period fit with our expectations that excessive heat leads to an increased risk of exiting the workforce. While our other analyses do not support a causal interpretation of these results, we think the null findings can be explained. For one, the lack of a significant increase in departures in the summer months is not altogether surprising. Texans know that summers are hot. Correctional officers might depart in the summer due to the heat, but they also might leave in cooler months in anticipation of rising temperatures. Furthermore, the null and flipped findings in the respective Pack Unit and COVID tests also seem like possible aberrations. The Pack Unit is a relatively small prison with only a couple hundred frontline

[1]Due to ongoing litigation regarding air conditioning in TDCJ facilities, we were unable to obtain this information directly from the TDCJ.

staff in an average month. Therefore, air-conditioning would have to induce a massive effect to generate a significant coefficient. This finding, along with the results from during the COVID pandemic, suggests that a ceiling exists to the possible retention benefits of air-conditioning. While air-conditioning can make difficult correctional work more palatable, it does not address all of the challenges associated with staffing the carceral state.

1 Understaffing in Prisons

It should not come as a surprise that departure rates are high among correctional officers. Colloquially described as "the toughest beat" (Page, 2011), correctional work is dangerous, low-paying, and stressful. A survey of state correctional officers in California found that 70% of respondents had witnessed someone be seriously injured or killed, while 18% reported being seriously injured at work (Lerman, Harney and Sadin, 2022). Correctional workers are also increasingly being asked to compensate for staff shortages by working longer hours with less support. In Georgia, for example, the state increased overtime spending for correctional workers by over 1000% between 2019 and 2022 despite the size of the correctional workforce decreasing by approximately 33% (Heffernan and Li, 2024). The snowballing effect of understaffing leading to worse conditions for remaining employees recently came to a head in New York when the head of the state's prisons system wrote in a memo that "70% of our original staffing model is the new 100%," which helped to instigate large-scale unauthorized strikes among dissatisfied correctional employees (Roebuck, 2025).

The numerous challenges of correctional work take a toll on correctional officers' physical and mental health. Correctional officers are at heightened risk of anxiety, Post-Traumatic Stress Disorder, burnout, job dissatisfaction, and COVID-19 infection (Cheeseman et al., 2011; Cullen et al., 1985; Finney et al., 2013; Lambert, 2001; Schwartz et al., 2024; Ward et al., 2021). Perhaps most disconcerting is the elevated risk of suicide among correctional officers. One study estimated that the suicide rate is 39% higher among correctional officers than the general public (Stack and Tsoudis, 1997), and more recent research suggests that elevated suicide rates persist (Frost and Monteiro, 2020; Lerman, Harney and Sadin, 2022). Several studies have also indicated that the severe stress and burnout tied to correctional

work are associated with higher departure rates among officers (Griffin, Hogan and Lambert, 2014; Lerman, Harney and Sadin, 2022; Vickovic, Morroe and Lambert, 2022).

Another strand of research identifies organizational factors that correlate with correctional officer retention and departure. Multiple studies have shown that correctional employees who are more committed to their organization are less likely to exit (Lambert and Hogan, 2009; Lambert, 2001; Mitchell et al., 2000). Employees who report better organizational support from the prison and higher-quality supervisors are less likely to depart their jobs (Griffin, Hogan and Lambert, 2014; Leip and Stinchcomb, 2013). Likewise, employees who express satisfaction with their coworkers are also at less risk of leaving (Minor et al., 2011).

Overall, existing evidence suggests that the difficulties of correctional work contribute to high levels of employee exits, although institutional support can increase retention. However, sizable gaps remain in the literature. Many studies of correctional officer exits are exploratory and rely on surveys fielded to a small number of respondents. It is difficult to generalize findings from a survey of a few hundred correctional officers in a single prison or prison system. Furthermore, the reliance on survey-based methods makes it difficult to assess how structural aspects of correctional officers' day-to-day experiences, such as working conditions and compensation, influence departure decisions. Understanding the impact of these factors, which in many cases underlie the psychological states scholars have shown to correlate with increased exit propensity, requires observing a large number of correctional officers experiencing different workplace conditions over time.

2 Heat in Prisons

Heat exposure is tied to numerous negative social outcomes. A large body of work has shown that gun violence and other forms of violent behavior are more prevalent on high-temperature days (Burke, Hsiang and Miguel, 2015; Colmer and Doleac, 2023; Hsiang, Burke and Miguel, 2013). Similarly, a sweeping meta-analysis of studies testing the effect of climate on conflict finds that a one standard deviation increase in temperature increases the frequency

of interpersonal violence and intergroup conflict by 4% and 14%, respectively (Hsiang, Burke and Miguel, 2013). Goodman et al. (2018) shows that heat exposure also leads to educational deficits, as warmer school days diminish learning and testing outcomes. Other studies have shown that heat negatively impacts economic productivity, civic engagement, and health (Deschenes, 2014; Lamare, 2013; Graff Zivin, Hsiang and Neidell, 2018).

The damaging effects of heat are exacerbated by the high-stress and highly restrictive environment typical of correctional institutions. Extreme heat is a persistent and largely unaddressed issue in many U.S. correctional facilities. Forty-four states lack universal air conditioning, including most Southern states where dangerous prison temperatures are most common (Tuholske et al., 2024). Temperatures in these non-air-conditioned prisons can exceed 130 degrees and have been likened to "torture chambers", "concrete coffins", and "sitting inside of a convection oven" (Lartey, 2023; Salhotra and Melhado, 2024). Incarcerated individuals sometimes adopt extreme measures to survive in these conditions, including flooding their cells to lie in the wet concrete, lighting fires, bathing in toilet water, or screaming in unison for help (Goodman, 2023; Wilson v. Dixon, N.d.).

Excessive heat in prisons has been linked to numerous negative consequences for incarcerated individuals, including higher rates of mortality, violence, suicide attempts, and health problems (Cloud et al., 2023; Lartey, 2023; Mukherjee and Sanders, 2021; Skarha et al., 2023; Tuholske et al., 2024). For example, Mukherjee and Sanders (2021) leverage daily variation in temperature to study the effect of heat on violence in Mississippi prisons. They find that days with unsafe heat index levels increase the number of daily violent interactions by 20%. Cloud et al. (2023) also show a strong positive association between high-temperature days and suicide-watch incidents on a sample of six state prisons in Louisiana. Another study found that roughly 13% of all deaths during warm months in Texas prisons may be attributable to extreme heat (Skarha et al., 2022).

While incarcerated individuals bear the brunt of extreme heat within prisons, correctional employees are also affected by the poor working conditions. Prisons often have air-conditioned administrative areas, but frontline officers spend a considerable amount of their time in

areas that lack air-conditioning. In addition to being uncomfortable, these conditions have serious effects on correctional officers' well-being. In Texas, between 2012 and 2013, 147 state correctional employees reported illness or injury due to heat (Martin, 2013). Across the state, incarcerated people have reported seeing correctional workers faint on account of heat (Deadly Heat in U.S. (Texas) Prisons, 2024). In New Jersey, correctional workers have reported that excessive heat has negatively affected their incident response times (Schuster and King, 2022). Even if not a threat to their own or incarcerated people's well being, working in a prison without air-conditioning is at best a major inconvenience. The head of the Louisiana Department of Public Safety and Corrections recently noted that officers in prisons without air conditioning were changing clothes up to three times per shift (O'Donoghue, 2022).

State legislators, investigative reports, and advocates have suggested that the poor conditions faced by correctional officers also contributes to understaffing in prisons (Ballard, 2022; McGivern, 2024; Salhotra, 2024). Heat can negatively impact employee retention in different ways. Most directly, correctional workers might be more likely to depart in search of jobs with better working conditions during the summer months when heat is particularly salient. However, anticipation effects can also arise. Employees may leave in the winter or spring in anticipation of summer heat or, given the association between heat and illness and injury, leave in the fall after weighing the health costs of working over the prior summer. Moreover, better applicants may opt out of correctional employment in facilities without air-conditioning all together, leaving prisons to be staffed by employees with higher baseline probabilities of departing.[2]

3 Data

We use two datasets to examine the relationship between prison air conditioning and the departure of correctional employees. The first consists of monthly snapshots of all correctional staff employed by the TDCJ from January 2010 through January 2023, which we received via

[2]Burton et al. (2023) shows that prison employees often did not have stable employment histories before becoming a correctional officer.

multiple public records requests to the agency. For each month, the data note the full name, age, facility, race, sex, full-time status, job title, and most recent hire date for all correctional staff employed in security positions at TDCJ facilities. Most employees in the dataset are in frontline correctional officer positions (83.7%), but the data also include first-line supervisors, such as sergeants, lieutenants, and captains, as well as managers (e.g., majors, assistant wardens, and wardens).[3] The personnel files do not include unique employee identification codes that follow employees throughout their tenure with the TDCJ. As a result, we assign unique employee identification codes by grouping together observations with similar ages and the same first name, middle initial, last name, race, last hire date, and sex. Since the codes include employees' last hire date with the TDCJ, they can capture instances where the same employee departs the workforce and then returns later in the study period.[4]

We determine whether correctional employees work in air-conditioned facilities using data published by the TPCA, a nonprofit advocacy organization. Through a public records request, the TPCA gathered data on whether TDCJ prisons' housing areas were fully, partially, or not air-conditioned as of April 2022.[5] The TPCA data are static snapshots. They do not note how air-conditioning coverage changed over the course of our study period. Thus, we restrict our analysis to facilities with full air conditioning or no air conditioning. In addition to offering a cleaner test, the tails of the air-conditioning coverage distribution are also less susceptible to over-time fluctuations. We are only aware of two prisons, Hodge and Pack, that had full air-conditioning installed during our study period after previously lacking any air-conditioning in housing areas. These installations followed 4-year legal battle between individuals incarcerated at the Pack Unit and the state, underscoring that the TDCJ rarely makes full-scale changes to prisons' air-conditioning (McCullough, 2017, 2018a; Blakinger and Banks, 2018).

It is also unlikely that the TDCJ installed full air-conditioning in a prison that was previously partially air-conditioned. Most partially air-conditioned prisons have, in practice, few

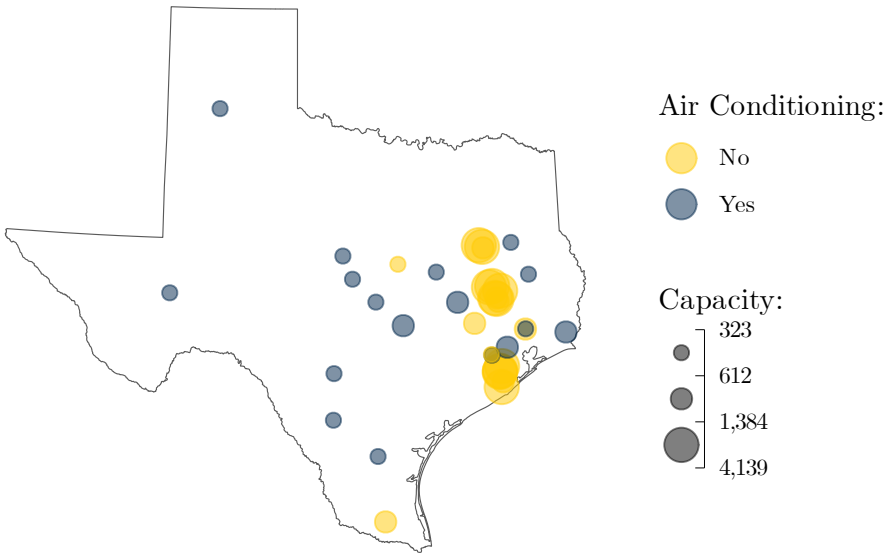
[3]The data also include some employees in auxiliary roles, like food and laundry managers.

[4]Approximately 13% of the unique employees in the dataset had more than one employment spell with the TDCJ.

[5]The TDCJ told the TPCA that administrative, educational, and medical areas are air-conditioned in all facilities.

air-conditioned beds. Installing full air-conditioning in one of these prisons is a considerable undertaking, similar to that which occurred in the Hodge and Pack Units. Finally, it is unlikely that a prison with no air-conditioning in 2022 was air-conditioned in the past. Ten of the twenty-four prisons identified in the TPCA data as having no air conditioning were built before 1920. Given the high costs of installation, it is unlikely that any prison, especially one over 100 years old, would remove air-conditioning after initially providing it.

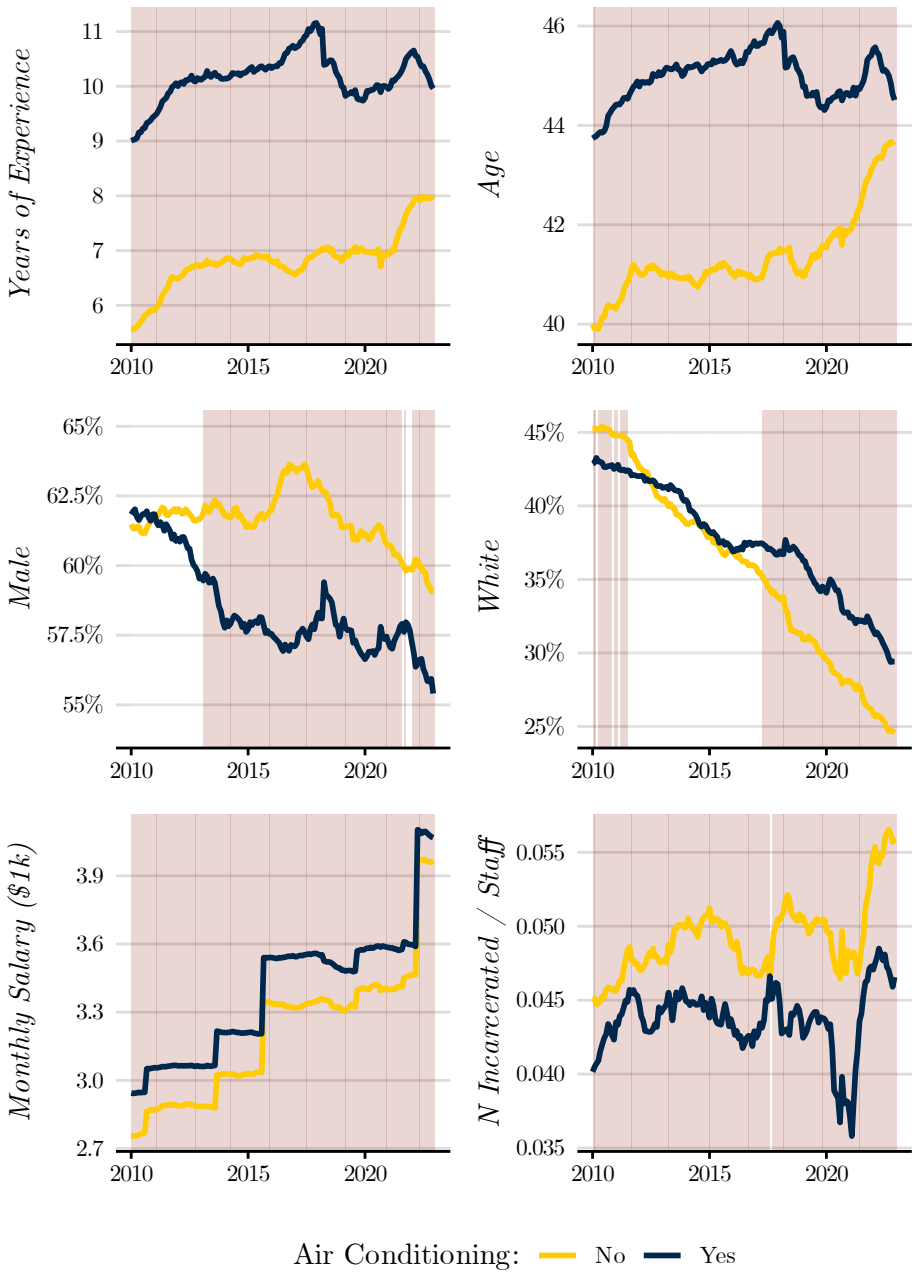
Figure 1 – Location of TDCJ Prisons Shows the location of the forty-one prisons operated by the TDCJ that have either full or no air conditioning. Points are binned into tertiles based on the number of incarcerated people the given prison can have in custody.



The resulting analysis dataset includes 40,335 distinct employees and 1,538,887 employee-month observations across forty-one facilities with either full or no air-conditioning (Figure 1). Air-conditioned facilities are smaller and more evenly distributed across the state than prisons without air conditioning, which are concentrated in the eastern part of the state. Employees in these facilities differ on other dimensions as well. Figure 2 shows descriptive characteristics of TDCJ correctional staff over the course of our study period. Monthly group means for employees in facilities with and without air-conditioning are shown in blue and yellow, respectively, while red highlighting indicates that the null hypothesis of no difference in means is rejected using a two-sided t test ($p<.05$).

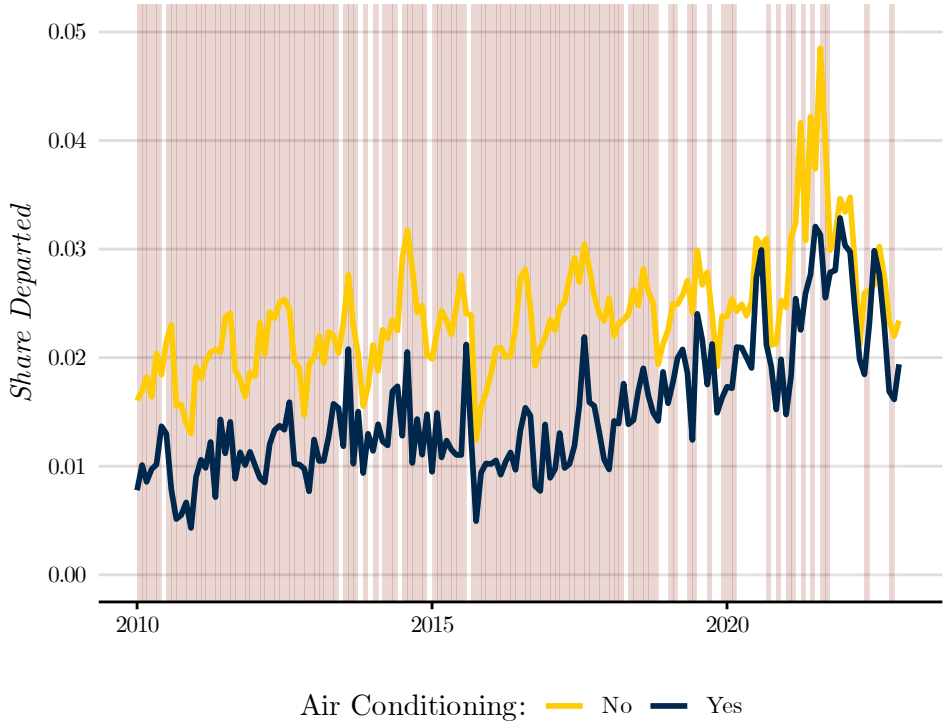
Employees in facilities without air-conditioning are significantly younger with fewer years of experience and lower earnings than their peers in air-conditioned facilities. The demographic composition of correctional employees also changed considerably over the study period. In 2010, over 40% of correctional employees were white. By 2023, only 30% of correctional employees in prisons without air-conditioning were white and an even smaller share of employees in prisons lacking air-conditioning were white. The Texas correctional workforce also became more female over the study period, with the share of female correctional employees across all prisons increasing from 38% to 42%. Finally, incarcerated-person-to-staff ratios are also higher in facilities without air-conditioning, underscoring both the difficulty of staffing these positions and the difficult conditions faced by remaining employees.

Figure 2 – Correctional Staff Differ Across Prisons With and Without AC Shows the mean years of experience, age, monthly salary, share male, share white, and incarcerated person/staff ratio in TDCJ facilities with and without air-conditioning by month. Time periods are highlighted in red if the null hypothesis of no difference in means is rejected using a two-sided t test ($p<.05$).



Our main outcome of interest is whether an employee departs the TDCJ workforce in a given month. We define this as an employee's last month of observed continuous employment. It encompasses both instances where an employee leaves the TDCJ workforce and does not return during our study period as well as cases of an employee leaving before later returning to correctional work. We do not know why someone leaves the workforce, only that they depart our dataset. Figure 3 shows the share of frontline correctional staff that depart each month from prisons with and without air-conditioning. The figure highlights a few key trends. First, up to around the onset of the COVID-19 pandemic, departures were more common in prisons without air-conditioning. Second, departures from prisons with air-conditioning began to increase starting around 2016. As a result, by the time the COVID-19 pandemic began, the difference in departures rates from prisons with and without air-conditioning had considerably narrowed. Finally, employee departures from both types of prisons spike following the onset of the pandemic in March 2020. Departure rates peak in summer and fall of 2021 and by the beginning of 2022 are largely similar across both types of prisons.

Figure 3 – Frontline Correctional Staff in Prisons Without AC More Likely to Depart Shows the share of frontline correctional employees that depart from prisons with and without air-conditioning each month. Time periods are highlighted in red if the null hypothesis of no difference in means is rejected using a two-sided t test ($p<.05$).



4 Methods

Air-conditioning is not randomly installed in TDCJ prisons. Older, larger prisons are less likely to have air-conditioning and employees in both types of prisons differ on dimensions, such as years of experience and age, that likely influence the likelihood of departing. Consequently, we use three different approaches to test whether air-conditioning affects the probability of correctional employees leaving their jobs. First, we compare departure rates across prisons with and without air-conditioning while holding constant potentially confounding variables. Second, we leverage seasonal fluctuations in temperature to see whether air-conditioning is more impactful during the summer months when heat is most salient. Third, we test whether the installation of air-conditioning in the Pack Unit decreased em-

ployees' probability of departing, relative to employees still working in facilities lacking air-conditioning. As one of the only prisons that experienced a full-scale installation of air-conditioning during our study period, the Pack Unit provides a rare case for examining how changes in workplace conditions over time influence departures.[6] The Pack Unit was completely air-conditioned beginning in April 2018 following a February court settlement between the TDCJ and a group of individuals incarcerated at the prison who sued the state. Despite the four-year court battle that preceded the settlement and installation, the eventual air-conditioning of the Pack Unit was still a quasi-shock. As the judge overseeing the case put it, "I never dreamt we'd get the Pack Unit air-conditioned" (McCullough, 2018b).

The main independent variable in the first selection on observables approach is whether an employee works in a prison with or without air-conditioning. Although we are able to control for a number of possible confounders, it is certainly possible that factors unaccounted for by the model correlate with both air-conditioning and the likelihood of departing. Therefore, in the second model the key coefficient of interest is on the interaction between the average monthly temperature of the county containing the employee's prison and whether the prison is air-conditioned.[7] In this approach, we test whether air-conditioning has a greater effect when heat is most salient to employees. It also limits potential sources of confounding, as unobserved sources of potential bias now need to correlate with the interaction of temperature and air conditioning status. Finally, in the third approach the main independent variable is the interaction between whether an employee works in the Pack Unit and a time indicator that is switched on following the court-ordered installation of air conditioning in the facility. In this setup, we only include employees working in either the Pack Unit or facilities without air-conditioning and limit the timespan to before the start of the COVID-19 pandemic. As a result, the interaction of the Pack Unit and time indicator captures whether departures decreased in the Pack Unit following installation.

All models are estimated using logit models with standard errors clustered at the em-

[6]The Hodge Unit also had air-conditioning installed sometime around 2018, but we exclude employees in the Hodge Unit from the analysis because of uncertainties over the exact month air-conditioning was installed.

[7]Figure A.1 in the SI shows the average monthly temperatures across counties with and without air-conditioning. There is no difference in average temperature across the two groups.

ployee level. In order to focus on the employees most affected by excessive heat, we filter the data to only frontline correctional officers. The dependent variable is whether an employee departs in a given month and all models include similar individual-, facility-, and state-level controls. At the individual-level, we control for employees' race, age, squared age, monthly salary, and sex. Following other studies of public sector turnover, we model years of experience using tenure length fixed effects (Bolton, de Figueiredo and Lewis, 2021). We opt to use a cubic time trend rather than a month-level fixed effect to avoid drowning out the seasonal effects of temperature.[8] We also control for facility-level factors that are likely to correlate with both departing and air-conditioning status, such as the average monthly temperature of the county containing the prison, the monthly unemployment rate of the county containing the prison, the percent change in the number of correctional employees working at the prison from the prior month, the year the facility was built, and the number of incarcerated people in the facility in a given month. Finally, we also include statewide binary controls for the three months before and after the four main statewide salary raises shown in the bottom facet of Figure 2.

5 Results

Table 1 shows the results of our first two modeling strategies. Due to the significant changes to the correctional system brought about by the COVID-19 pandemic, we estimate separate models for before and after March 2020. The selection on observables results are shown in the first and third columns of Table 1. The second and fourth columns show the results of the interaction between temperature and air-conditioning before and during the COVID-19 pandemic, respectively. We present the coefficients and corresponding 95% confidence intervals as odds ratios to ease interpretation.[9]

The results paint a mixed picture of the impact of air-conditioning on the probability of employees departing the TDCJ workforce. Before COVID-19, the odds of employees in prisons without air-conditioning departing were, on average, 20% higher than for their peers

[8] Our main results are unchanged using monthly fixed effects.

[9] Table B.3 shows the results of models estimated using observations pooled from both before and during the pandemic.

in air-conditioned facilities. The magnitude of this correlation is relatively large. For example, it roughly corresponds to the size of the association between departing and a $1,000 decrease in monthly earnings.[10] However, the result not only disappears but actually reverses following the onset of the pandemic. From March 2020 through January 2023, the odds of employees in facilities without air-conditioning departing were 11% lower, relative to correctional officers in prisons with air-conditioning. During the pandemic, correctional workers in hotter facilities were actually less likely to exit the TDCJ workforce than their peers in air-conditioned facilities.

The coefficients on working in a facility without air-conditioning in the first and third models of Table 1 are associations. Unobserved variables may correlate with both whether an employee works in a facility without air-conditioning and the probability of departing, potentially biasing our results. This is likely especially a problem during the pandemic when prisons faced numerous new challenges that are difficult to fully account for in our model. Nevertheless, we do think that these correlations, especially before the onset of the pandemic, are picking up on a real relationship between heat and departures. For one, we show in Table B.2 that, before COVID, supervisors in prisons without air-conditioning were no more likely to depart than employees in supervisory positions in prisons with air-conditioning. This makes sense if heat is actually driving our results, since, according to the TDCJ, all prisons have air-conditioning in the administrative areas where supervisors are more likely to work. In addition, we show in Figure B.2 that the increased risk of departing among employees in prisons without air-conditioning is largely isolated to new hires. For the most part, employees with more than a few years of experience are just as likely to depart if they work in a prison with or without air-conditioning. This also adds robustness to our findings as working in extreme heat likely bears a disproportionate impact on those not yet acquainted to it.

While our results suggest that excessive heat in facilities lacking air-conditioning does influence correctional officers' departure decisions, we do not find that employees in facilities without air-conditioning are more likely to depart during the hotter summer months. Models

[10]Mean monthly earnings over the study period are $3,140, so a $1,000 decrease roughly equates to a 32% salary cut.

Table 1 – Correctional Officers More Likely to Depart Prisons Without AC Pre-COVID The first and third models examine whether air-conditioning correlates with increased departures before and after, respectively, the onset of the COVID-19 pandemic. The second and fourth models test whether temperature moderates the effect of air-condtioning on departures before and after, respectively, the beginning of the COVID-19 pandemic. Coefficients displayed as odds ratios with 95% confidence intervals in parentheses.

	Pre-COVID		COVID	
	(1)	(2)	(3)	(4)
No AC	1.20*	1.19	0.89*	0.99
	[1.14; 1.26]	[0.96; 1.48]	[0.83; 0.97]	[0.71; 1.38]
No AC * Temperature		1.00		1.00
		[1.00; 1.00]		[0.99; 1.00]
Temperature	1.01*	1.01*	1.01*	1.01*
	[1.01; 1.01]	[1.00; 1.01]	[1.01; 1.01]	[1.00; 1.01]
Unemployment Rate	0.99	0.99	1.02	1.02
	[0.98; 1.01]	[0.98; 1.01]	[1.00; 1.03]	[1.00; 1.03]
White	1.27*	1.27*	1.37*	1.37*
	[1.23; 1.31]	[1.23; 1.31]	[1.29; 1.44]	[1.29; 1.44]
Monthly Salary ($1k)	0.77*	0.77*	0.72*	0.72*
	[0.74; 0.80]	[0.74; 0.80]	[0.69; 0.75]	[0.69; 0.75]
Age	0.91*	0.91*	0.93*	0.93*
	[0.90; 0.91]	[0.90; 0.91]	[0.92; 0.94]	[0.92; 0.94]
Age^2	1.00*	1.00*	1.00*	1.00*
	[1.00; 1.00]	[1.00; 1.00]	[1.00; 1.00]	[1.00; 1.00]
Male	0.86*	0.86*	0.93*	0.93*
	[0.83; 0.88]	[0.83; 0.88]	[0.88; 0.97]	[0.88; 0.97]
3 months before raise	0.96	0.96	0.88*	0.88*
	[0.90; 1.01]	[0.90; 1.01]	[0.79; 0.98]	[0.79; 0.98]
3 months after raise	0.82*	0.82*	0.83*	0.83*
	[0.78; 0.87]	[0.78; 0.87]	[0.76; 0.92]	[0.75; 0.92]
Pct staffing change	0.99*	0.99*	1.00	1.00
	[0.99; 1.00]	[0.99; 1.00]	[1.00; 1.00]	[1.00; 1.00]
Year built	1.00	1.00	1.00	1.00
	[1.00; 1.00]	[1.00; 1.00]	[1.00; 1.00]	[1.00; 1.00]
N incarcerated (100)	1.01*	1.01*	1.01*	1.01*
	[1.01; 1.01]	[1.01; 1.01]	[1.01; 1.02]	[1.01; 1.02]
Tenure FE	✓	✓	✓	✓
Cubic Time Trend	✓	✓	✓	✓

* Null hypothesis value outside the confidence interval.

2 and 4 in Table 1 show that, both before and during the pandemic, the interaction between working in a facility without air-conditioning and average monthly temperature is null. In an alternative specification, we show that departure rates in facilities with and without air-conditioning follow a similar trend throughout the year (Figure B.1). Although the baseline departure rate is higher for employees in prisons without air-conditioning, the probability of both types of employees departing rises in the late spring and early summer before peaking in July and August. We also show in Table B.4 that the interaction between air-conditioning status and monthly temperature remains null among less-experienced employees.

Finally, given the lack of large-N studies on correctional officer turnover, it is worthwhile examining the coefficients on the control variables in Table 1. Following the descriptive trends in Figure 3, the odds of white correctional officers exiting the workforce in a given month were 27% higher than for employees of other racial backgrounds. Likewise, male employees were also less likely to depart than their female peers. Both before and after the onset of COVID-19, higher-earning employees were less likely to depart. While statistical significance is mixed, the results also suggest that employees were less likely to depart in the 3-month periods prior to and following salary raises. Other notable results include a positive correlation between departing and the number of incarcerated individuals in a prison as well as, at least before the pandemic, an increased risk of leaving in the month following a reduction in staffing levels.[11]

The results of our final test examining the effect of air-conditioning installation in the Pack Unit in April 2018 are shown in Table 2. The model includes the same controls employee-, facility-, and state-level controls as in Table 1. The main coefficient of interest is on the interaction between whether a correctional officers works in the Pack Unit ($Pack$) and an indicator for whether the month falls after April 2018 ($Post - Installation$). Overall, there is no evidence that departures from the Pack Unit decreased following the installation of air-conditioning. The estimate on the interaction term suggests that departures actually increased following the installation of air-conditioning.[12] However, the small size of the Pack

[11]The estimates of the control variables are similar if the models are run separately for employees working in facilities with and without air-conditioning (Table B.1).

[12]Findings are similar and reach statistical significance if the model is re-estimated to include observations

Table 2 – No Evidence Installing AC in Pack Unit Decreased Departures
Shows the results of a logit model testing whether departures decreased from the Pack unit following the installation of air-conditioning in April 2018 due to a court order. Post period includes months up to February 2020. Coefficients displayed as odds ratios with 95% confidence intervals in parentheses.

Pack * Post-Installation	1.07
	[0.83; 1.37]
Pack	0.77*
	[0.68; 0.86]
Post-Installation	0.89*
	[0.82; 0.98]
Tenure FE	✓
Cubic Time Trend	✓
Controls	✓

* 1 outside the confidence interval.

Unit means that the estimate is noisy and we lack power to confidently reject anything but large effects of air-conditioning installation on departures.[13]

6 Discussion

Reformers have long framed the lack of air-conditioning in many U.S. prisons as a moral and constitutional issue. We argue that it also matters for worker safety and retention. Using personnel data from the largest state prison system in the U.S., we show that working in a Texas prison without air-conditioning correlates with an increased probability of departing the correctional workforce. However, interpreting this result is not entirely straightforward. Following the onset of the COVID-19 pandemic, the relationship between exiting and working in a prison lacking air-conditioning reverses. Furthermore, there is no indication that hotter temperatures moderated the relationship between air-conditioning and departing or that the 2018 installation of air-conditioning in the Pack Unit led to reduced departures.

Despite the mixed findings, we do see some plausible interpretations of our results. Although the potential for unobserved confounding exists, we believe that the pre-COVID

from during the pandemic (Table C.1).

[13]The Pack Unit employed roughly 200 frontline correctional officers in a given month over the study period (Figure C.1).

correlation between working in a prison without air-conditioning and departing is closer to the underlying truth than our null and reversed findings. The onset of COVID-19 brought considerable new challenges to working in prisons that cannot be fully accounted for in our model. Likewise, while our causal test with temperature interactions is precise, it is very conservative. Correctional employees, especially in Texas, know that it will get hot in the summer months. They also likely know even before they start their jobs whether they will be working in a facility without air-conditioning. As a result, departures might occur in anticipation of excessive heat, not only in the summer months. Finally, the Pack Unit test is likely underpowered. Given the small number of employees working in the prison (approximately 200 in any month) and the relatively short time period between air-conditioning installation and the onset of COVID-19, air-conditioning would have to have a massive effect on departures to be uncovered.

Our work has a few key limitations, which should be improved upon in future work. First, while our longitudinal study is an improvement upon existing research, we are limited by the lack of air-conditioning installation that occurred during the study period. Second, exiting the workforce is one, particularly extreme, measure that correctional workers can take in the wake of poor conditions. They can also, for example, take vacation days, or be forced to work additional overtime shifts to cover for higher vacancy rates. Future work should incorporate these variables as other dependent variables. Finally, while Texas is a particularly salient case for studying the relationship between heat and correctional officer turnover, correctional officers in other states might be even more responsive to heat. Climate change is increasing the number of hot summer days across the country in places where people are less used to excessive heat (Tuholske et al., 2024).

Our results also point to the other considerable challenges faced by correctional officers. Despite its benefits, air-conditioning cannot solve the violence, stress, and trauma that make correctional work particularly taxing. While cooler prisons help both incarcerated people and correctional staff, air-conditioning does not address the underlying pathologies of prisons that make them a challenging environment for both incarcerated individuals and correctional staff.

References

Ballard, Mark. 2022. "Unlike most southern states, louisiana is working to install air conditioning in prisons.". tex.howpublished: The Advocate.
URL: *https://www.theadvocate.com/baton$_r$ouge/news/politics/legislature/unlike − most − southern − states − louisiana − is − working − to − install − air − conditioning − in − prisons/article$_9$dcc4d8e − 14f7 − 11ed − 8963 − ffb80a1fd93d.html*

Blakinger, Keri and Gabrielle Banks. 2018. "Texas prison system to install air conditioning at additional unit." Chron .
URL: *https://www.chron.com/news/houston-texas/article/Texas-prison-system-to-install-air-conditioning-13192364.php*

Bolton, Alexander, John M de Figueiredo and David E Lewis. 2021. "Elections, Ideology, and Turnover in the US Federal Government." Journal of Public Administration Research and Theory 31(2):451–466.
URL: *https://doi.org/10.1093/jopart/muaa051*

Burke, Marshall, Solomon M Hsiang and Edward Miguel. 2015. "Climate and conflict." Annual Review of Economics, Vol 3 7(1):577–617. Publisher: Annual Reviews.

Burton, Alexander L, Cheryl Lero Jonson, William T Miller, Damon M Petrich and Velmer S Burton. 2023. "Understanding who is hired to work in US prisons and why it matters: A call for research." Corrections : policy, practice and research pp. 1–22.

Cheeseman, Kelly A., Kim , Bitna, Lambert , Eric G., and Nancy L. Hogan. 2011. "Correctional officer perceptions of inmates and overall job satisfaction." Journal of Crime and Justice 34(2):81–102.
URL: *https://doi.org/10.1080/0735648X.2011.580515*

Cloud, David H, Brie Williams, Regine Haardörfer, Lauren Brinkley-Rubinstein and Hannah LF Cooper. 2023. "Extreme heat and suicide watch incidents among incarcerated men." JAMA network open 6(8):e2328380–e2328380. Publisher: American Medical Association.

Colmer, Jonathan and Jennifer L Doleac. 2023. "Access to guns in the heat of the moment: more restrictive gun laws mitigate the effect of temperature on violence." Review of Economics and Statistics pp. 1–40. Publisher: MIT Press One Rogers Street, Cambridge, MA 02142-1209, USA journals-info ....

Cullen, Francis T., Bruce G. Link, Nancy T. Wolfe and James Frank. 1985. "The social dimensions of correctional officer stress." Justice Quarterly 2(4):505–533. Publisher: Routledge _eprint: https://doi.org/10.1080/07418828500088711.
URL: *https://doi.org/10.1080/07418828500088711*

Dang, Anna. 2022. "Extreme heat creates hazardous work conditions for Texas corrections staff.".

URL: *https://www.afscme.org/blog/extreme-heat-creates-hazardous-work-conditions-for-texas-corrections-staff*

Deadly Heat in U.S. (Texas) Prisons. 2024. Technical report University of Texas School of Law Human Rights Clinic.

Deschenes, Olivier. 2014. "Temperature, human health, and adaptation: A review of the empirical literature." Energy Economics 46:606–619. Publisher: Elsevier.

Ferdik, Frank Valentino and Phillip Hills. 2018. "Analyzing further predictors of correctional officer professional orientations: The role of turnover intentions." International Journal of Offender Therapy and Comparative Criminology 62(6):1668–1693. Publisher: SAGE Publications Sage CA: Los Angeles, CA.

Finney, Caitlin, Erene Stergiopoulos, Jennifer Hensel, Sarah Bonato and Carolyn S. Dewa. 2013. "Organizational stressors associated with job stress and burnout in correctional officers: a systematic review." BMC Public Health 13(1):82.
URL: *https://doi.org/10.1186/1471-2458-13-82*

Frost, Natasha A and Carlos E Monteiro. 2020. "The interaction of personal and occupational factors in the suicide deaths of correction officers." Justice Quarterly 37(7):1277–1302.

Goodman, David J. 2023. "'Man down!': Surviving the texas heat in prisons without air-conditioning.".
URL: *https://www.nytimes.com/2023/06/29/us/texas-prisons-heat.html*

Goodman, Joshua, Michael Hurwitz, Jisung Park and Jonathan Smith. 2018. Heat and learning. Technical report National Bureau of Economic Research.

Graff Zivin, Joshua, Solomon M Hsiang and Matthew Neidell. 2018. "Temperature and human capital in the short and long run." Journal of the Association of Environmental and Resource Economists 5(1):77–105. Publisher: University of Chicago Press Chicago, IL.

Griffin, Marie L, Nancy L Hogan and Eric G Lambert. 2014. "Career stage theory and turnover intent among correctional officers." Criminal Justice and Behavior 41(1):4–19. Publisher: SAGE Publications Sage CA: Los Angeles, CA.

Heffernan, Shannon and Weihua Li. 2024. "New data shows how dire the prison staffing shortage really is.". tex.howpublished: The Marshall Project.
URL: *https://www.themarshallproject.org/2024/01/10/prison-correctional-officer-shortage-overtime-data*

Hsiang, Solomon M, Marshall Burke and Edward Miguel. 2013. "Quantifying the influence of climate on human conflict." Science 341(6151):1235367. Publisher: American Association for the Advancement of Science.

Lamare, J Ryan. 2013. "Mobilization and voter turnout: Should canvassers worry about the weather?" PS: Political Science & Politics 46(3):580–586. Publisher: Cambridge University Press.

Lambert, Eric G. 2001. "To stay or quit: A review of the literature on correctional staff turnover." American Journal of Criminal Justice 26(1):61–76. Company: Springer Distributor: Springer Institution: Springer Label: Springer Number: 1 Publisher: Springer-Verlag.
URL: *https://link.springer.com/article/10.1007/BF02886857*

Lambert, Eric and Nancy Hogan. 2009. "The importance of job satisfaction and organizational commitment in shaping turnover intent: A test of a causal model." Criminal justice review 34(1):96–118. Publisher: SAGE Publications Sage CA: Los Angeles, CA.

Lartey, Jamiles. 2023. "'Concrete coffins': Surviving extreme heat behind bars.". tex.howpublished: The Marshall Project.
URL: *https://www.themarshallproject.org/2023/07/22/texas-heat-prison-louisiana*

Leip, Leslie A. and Jeanne B. Stinchcomb. 2013. "Should I Stay or Should I go?: Job Satisfaction and Turnover Intent of Jail Staff Throughout the United States." Criminal Justice Review 38(2):226–241. Publisher: SAGE Publications Inc.
URL: *https://doi.org/10.1177/0734016813478822*

Lerman, Amy E, Jessie Harney and Meredith Sadin. 2022. "Prisons and mental health: Violence, organizational support, and the effects of correctional work." Criminal justice and behavior 49(2):181–199.

Lieb, David A. 2023. "Mounting job vacancies push state and local governments into a wage war for workers.". tex.howpublished: Associated Press.
URL: *https://apnews.com/article/state-job-vacancies-pay-raises-wage-war-74d1689d573e298be32f3848fcc88f46*

Martin, Brittney. 2013. "Texas guards, inmates could unite in suit over lack of AC." Dallas Morning News, The (TX) p. A01.

McCullough, Jolie. 2017. "Heat is part of life at Texas prisons, but federal judge orders one to cool it." The Texas Tribune .
URL: *https://www.texastribune.org/2017/07/20/texas-prison-heat-air-conditioning-lawsuit/*

McCullough, Jolie. 2018a. "After $7 million legal fight over air conditioning, Texas prison system touts new heat safety policies." The Texas Tribune .
URL: *https://www.texastribune.org/2018/07/26/texas-prison-heat-air-conditioning-costs/*

McCullough, Jolie. 2018b. "Judge approves settlement mandating air conditioning at hot Texas prison." The Texas Tribune .
URL: *https://www.texastribune.org/2018/05/08/settlement-air-condition-hot-texas-prison-gets-final-judicial-approval/*

McGivern, Kylie. 2024. "Florida prison heat complaints shockingly low despite growing safety concerns about lack of air conditioning." ABC Action News Tampa Bay (WFTS) . Section: I-Team Investigations.
URL: *https://www.abcactionnews.com/news/local-news/i-team-investigates/florida-prison-heat-complaints-shockingly-low-despite-growing-safety-concerns-about-lack-of-air-conditioner*

Minor, Kevin I, James B Wells, Earl Angel and Adam K Matz. 2011. "Predictors of early job turnover among juvenile correctional facility staff." Criminal Justice Review 36(1):58–75. Publisher: SAGE Publications Sage CA: Los Angeles, CA.

Mitchell, Ojmarrh, Doris Layton Mackenzie, Gaylene J. Styve and Angela R. Gover. 2000. "The impact of individual, organizational, and environmental attributes on voluntary turnover among juvenile correctional staff members." Justice Quarterly 17(2):333–357.
URL: *https://doi.org/10.1080/07418820000096351*

Mukherjee, Anita and Nicholas J Sanders. 2021. The causal effect of heat on violence: social implications of unmitigated heat among the incarcerated. Technical report National Bureau of Economic Research.

Nam-Sonenstein, Brian and Emmett Sanders. 2024. "Why jails and prisons can't recruit their way out of the understaffing crisis.". tex.howpublished: Prison Policy Initative.
URL: *https://www.prisonpolicy.org/blog/2024/12/09/understaffing/*

O'Donoghue, Julie. 2022. "Louisiana prison officials push for air conditioning after fighting lawsuit • Louisiana Illuminator.".
URL: *https://lailluminator.com/2022/03/22/louisiana-prison-officials-push-for-air-conditioning-after-fighting-lawsuit/*

Page, Joshua. 2011. The toughest beat: Politics, punishment, and the prison officers union in California. Oxford University Press.

Roebuck, Sarah. 2025. "N.Y. prison strike: What led to it, state response and what could come next." Corrections1 . Section: Officer Safety.
URL: *https://www.corrections1.com/Officer-Safety/n-y-prison-strike-what-led-to-it-state-response-and-what-could-come-next*

Salhotra, Pooja. 2024. "Texas' prison guard shortfall makes it harder for inmates to get reprieve from extreme indoor heat, critics say." The Texas Tribune .
URL: *https://www.texastribune.org/2024/09/11/texas-prisons-staffing-shortages-heat/*

Salhotra, Pooja. 2025. "Federal judge rules prison heat conditions are unconstitutional, but doesn't require air conditioning." The Texas Tribune .
URL: *https://www.texastribune.org/2025/03/26/texas-prison-air-conditioning-lawsuit/*

Salhotra, Pooja and William Melhado. 2024. "Texas inmates are being 'cooked to death' in extreme heat, complaint alleges.". tex.howpublished: The Texas Tribune.
URL: *https://www.texastribune.org/2024/04/22/texas-prisons-heat-deaths/*

Schuster, Terry and Kristin King. 2022. Special Report: Summer Heat in New Jersey Prisons. Technical report New Jersey Office of the Corrections Ombudsperson.

Schwartz, Joseph A., Bradon Valgardson, Christopher A. Jodis, Daniel P. Mears and Benjamin Steiner. 2024. "The accumulated impact of critical incident exposure on correctional officers' mental health." Criminology 62(3):551–586. _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1111/1745-9125.12379.
URL: *https://onlinelibrary.wiley.com/doi/abs/10.1111/1745-9125.12379*

Skarha, Julianne, Amite Dominick, Keith Spangler, David Dosa, Josiah D Rich, David A Savitz and Antonella Zanobetti. 2022. "Provision of air conditioning and heat-related mortality in Texas prisons." JAMA Network Open 5(11):e2239849–e2239849. Publisher: American Medical Association.

Skarha, Julianne, Keith Spangler, David Dosa, Josiah D Rich, David A Savitz and Antonella Zanobetti. 2023. "Heat-related mortality in US state and private prisons: a case-crossover analysis." PLoS one 18(3):e0281389. Publisher: Public Library of Science San Francisco, CA USA.

Stack, STEVEN J. and Olga Tsoudis. 1997. "Suicide risk among correctional officers: A logistic regression analysis." Archives of Suicide Research 3(3):183–186.
URL: *https://doi.org/10.1023/A:1009677102357*

Tuholske, Cascade, Victoria D Lynch, Raenita Spriggs, Yoonjung Ahn, Colin Raymond, Anne E Nigra and Robbie M Parks. 2024. "Hazardous heat exposure among incarcerated people in the United States." Nature Sustainability 7(4):394–398. Publisher: Nature Publishing Group UK London.

Vickovic, Samuel G., Weston James Morroe and Eric Lambert. 2022. "Examining the effects of job burnout and work-family conflict on correctional officer turnover intent." Criminal Justice Studies 35(2):111–131. Publisher: Routledge _eprint: https://doi.org/10.1080/1478601X.2022.2066660.
URL: *https://doi.org/10.1080/1478601X.2022.2066660*

Ward, Julie A., Kalind Parish, Grace DiLaura, Sharon Dolovich and Brendan Saloner. 2021. "COVID-19 Cases Among Employees of U.S. Federal and State Prisons." American Journal of Preventive Medicine 60(6):840–844.
URL: *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7898987/*

Wilson v. Dixon. N.d.

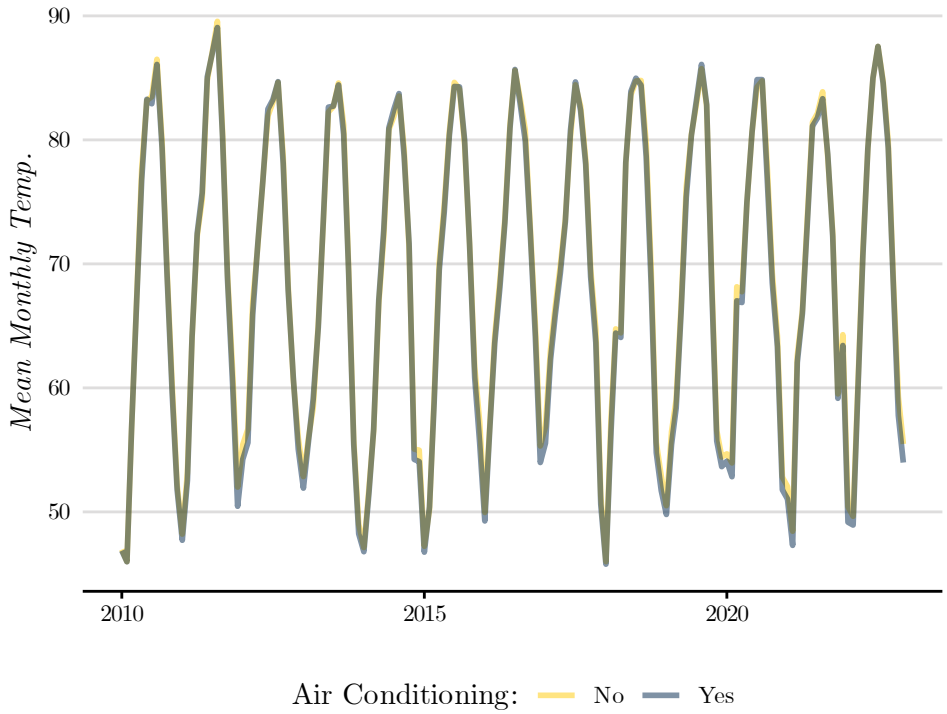
Supplementary Information

Excessive Heat and Correctional Officer Departures: Evidence from Texas

Benjamin Goehring and Jacob Harris

A Heat in Texas

Figure A.1 – Mean Monthly Temperature of Counties with Prisons, by AC Status Shows the mean monthly temperature of counties containing prisons that have full and no air conditioning, respectively.



B Additional Results

Figure B.1 – Predicted Probability of Departing, by Month of Year
Shows the predicted probability of departing for correctional officers employed in facilities with and without air-conditioning by month of the year. Control variables are set to their means. The model excludes time fixed effects.

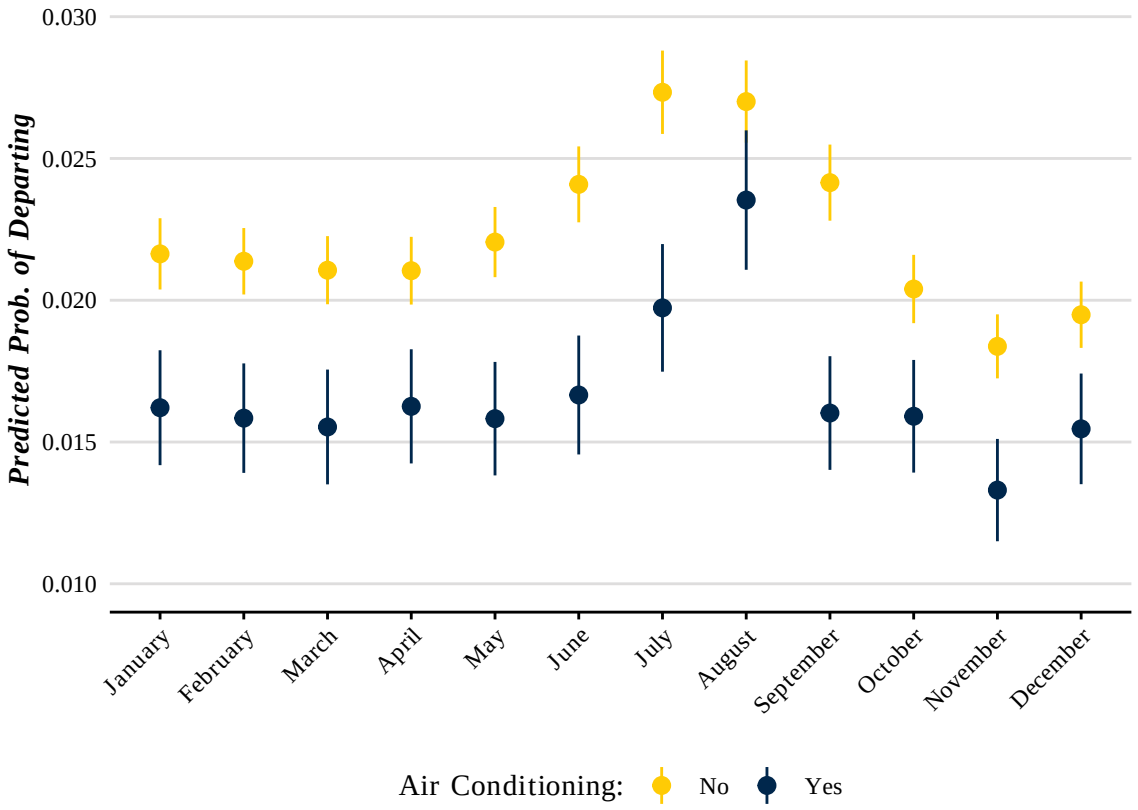


Table B.1 – Control Variables, by AC Status Shows our control variables, estimated seperately for employees in prisons with and without AC before and during the COVID-19 pandemic.

	Pre-COVID		COVID	
	AC	No AC	AC	No AC
Temperature	1.01*	1.01*	1.01*	1.01*
	[1.00; 1.01]	[1.01; 1.01]	[1.00; 1.01]	[1.00; 1.01]
Unemployment Rate	0.99	0.99	1.00	1.03*
	[0.96; 1.01]	[0.97; 1.01]	[0.97; 1.02]	[1.00; 1.05]
White	1.18*	1.30*	1.30*	1.39*
	[1.09; 1.27]	[1.25; 1.34]	[1.18; 1.45]	[1.30; 1.49]
Monthly Salary ($1k)	0.43*	0.78*	0.66*	0.73*
	[0.35; 0.52]	[0.75; 0.81]	[0.60; 0.72]	[0.69; 0.76]
Age	0.87*	0.92*	0.91*	0.93*
	[0.85; 0.88]	[0.91; 0.93]	[0.89; 0.93]	[0.92; 0.94]
Age^2	1.00*	1.00*	1.00*	1.00*
	[1.00; 1.00]	[1.00; 1.00]	[1.00; 1.00]	[1.00; 1.00]
Male	0.85*	0.86*	0.89*	0.94*
	[0.79; 0.91]	[0.83; 0.88]	[0.81; 0.98]	[0.89; 1.00]
3 months before raise	0.95	0.95	0.92	0.86*
	[0.82; 1.10]	[0.90; 1.01]	[0.75; 1.13]	[0.76; 0.97]
3 months after raise	0.88	0.82*	0.91	0.81*
	[0.76; 1.02]	[0.77; 0.87]	[0.75; 1.11]	[0.72; 0.91]
Pct staffing change	1.00	0.99*	0.99*	1.01*
	[0.99; 1.01]	[0.99; 1.00]	[0.98; 1.00]	[1.00; 1.01]
Year built	1.03*	1.00	1.01*	1.00
	[1.02; 1.04]	[1.00; 1.00]	[1.00; 1.02]	[1.00; 1.00]
N incarcerated (100)	1.03*	1.01*	1.03*	1.02*
	[1.01; 1.04]	[1.00; 1.01]	[1.01; 1.05]	[1.01; 1.02]
Tenure FE	✓	✓	✓	✓
Cubic Time Trend	✓	✓	✓	✓

* Null hypothesis value outside the confidence interval.

Table B.2 – Supervisors No More Likely to Depart from Prisons Without AC Replicates tests in Table 1 using supervisors rather than frontline correctional officers.

	Pre-COVID		COVID	
	(1)	(2)	(3)	(4)
No AC	1.03	1.25	0.93	0.85
	[0.91; 1.17]	[0.71; 2.19]	[0.75; 1.17]	[0.35; 2.06]
Temperature	1.01*	1.01*	1.01*	1.01
	[1.00; 1.01]	[1.00; 1.02]	[1.00; 1.02]	[1.00; 1.02]
No AC * Temperature		1.00		1.00
		[0.99; 1.01]		[0.99; 1.01]
Unemployment Rate	1.04*	1.04*	1.00	1.00
	[1.00; 1.08]	[1.00; 1.08]	[0.96; 1.05]	[0.96; 1.05]
White	1.16*	1.16*	1.25*	1.25*
	[1.06; 1.26]	[1.06; 1.26]	[1.08; 1.44]	[1.08; 1.44]
Monthly Salary ($1k)	0.79*	0.79*	0.91	0.91
	[0.72; 0.87]	[0.72; 0.87]	[0.80; 1.05]	[0.80; 1.05]
Age	0.87*	0.87*	0.90*	0.90*
	[0.85; 0.89]	[0.85; 0.89]	[0.86; 0.95]	[0.86; 0.95]
Age^2	1.00*	1.00*	1.00*	1.00*
	[1.00; 1.00]	[1.00; 1.00]	[1.00; 1.00]	[1.00; 1.00]
Male	0.84*	0.84*	0.85*	0.85*
	[0.77; 0.92]	[0.77; 0.92]	[0.74; 0.99]	[0.74; 0.99]
3 months before raise	1.04	1.04	0.97	0.98
	[0.89; 1.22]	[0.89; 1.23]	[0.72; 1.32]	[0.72; 1.32]
3 months after raise	0.86	0.86	0.87	0.87
	[0.73; 1.01]	[0.73; 1.01]	[0.65; 1.17]	[0.65; 1.17]
Pct staffing change	1.01	1.01	1.00	1.00
	[1.00; 1.02]	[1.00; 1.02]	[0.98; 1.01]	[0.98; 1.01]
Year built	1.00	1.00	1.00	1.00
	[1.00; 1.00]	[1.00; 1.00]	[1.00; 1.00]	[1.00; 1.00]
N incarcerated (100)	1.00	1.00	1.00	1.00
	[1.00; 1.01]	[1.00; 1.01]	[0.99; 1.01]	[0.99; 1.01]
Cubic Time Trend	✓	✓	✓	✓
Tenure FE	✓	✓	✓	✓

* Null hypothesis value outside the confidence interval.

Table B.3 – Correctional Officers More Likely to Depart Prisons Without AC, 2010 - 2023 Replicates main results in Table 1 using the full dataset from 2010 to 2023.

	(1)	(2)
No AC	1.10*	1.17
	[1.05; 1.14]	[0.97; 1.40]
No AC * Temperature		1.00
		[1.00; 1.00]
Temperature	1.01*	1.01*
	[1.01; 1.01]	[1.01; 1.01]
Unemployment Rate	1.00	1.00
	[1.00; 1.01]	[1.00; 1.01]
White	1.29*	1.29*
	[1.26; 1.33]	[1.26; 1.33]
Monthly Salary ($1k)	0.74*	0.74*
	[0.72; 0.76]	[0.72; 0.76]
Age	0.91*	0.91*
	[0.91; 0.92]	[0.91; 0.92]
Age^2	1.00*	1.00*
	[1.00; 1.00]	[1.00; 1.00]
Male	0.88*	0.88*
	[0.85; 0.90]	[0.85; 0.90]
3 months before raise	0.97	0.97
	[0.93; 1.02]	[0.93; 1.02]
3 months after raise	0.85*	0.85*
	[0.81; 0.89]	[0.81; 0.89]
Pct staffing change	0.99*	0.99*
	[0.99; 1.00]	[0.99; 1.00]
Year built	1.00	1.00
	[1.00; 1.00]	[1.00; 1.00]
N incarcerated (100)	1.01*	1.01*
	[1.01; 1.01]	[1.01; 1.01]
Tenure FE	✓	✓
Cubic Time Trend	✓	✓

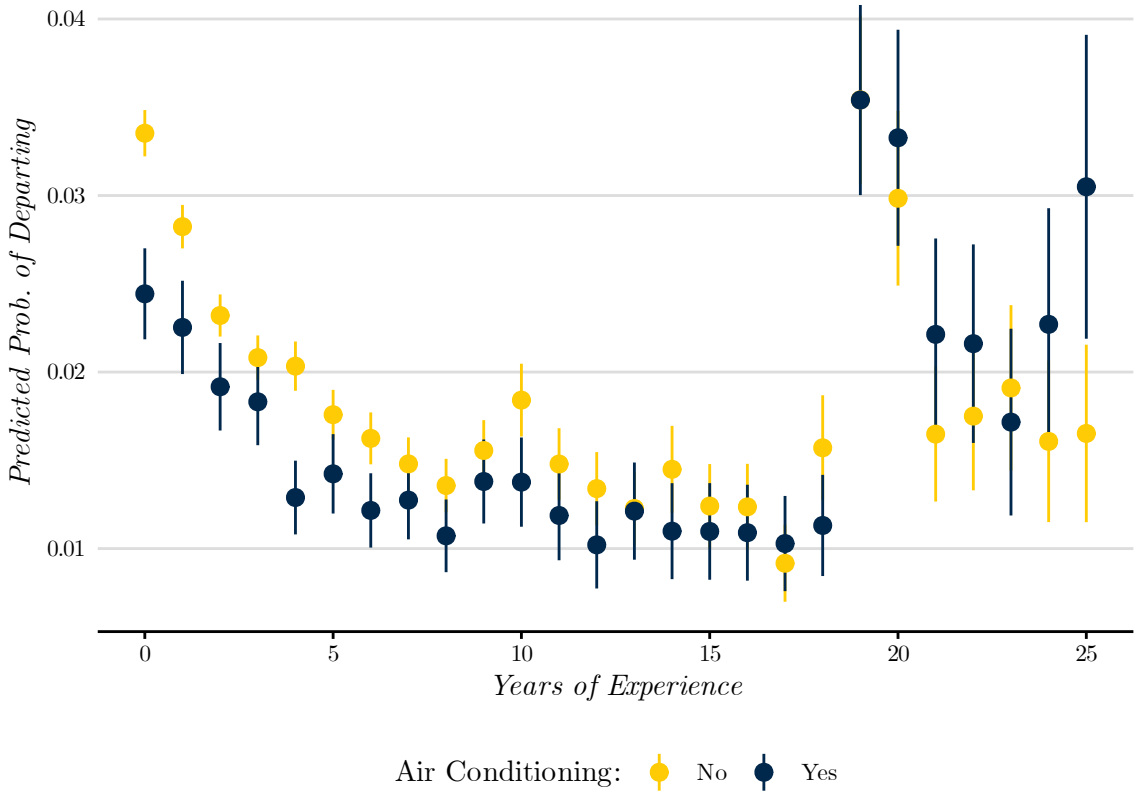
* Null hypothesis value outside the confidence interval.

Table B.4 – Less Experienced Employees No More Likely to Depart From Facilities Without AC in the Summer The first model shows the result of a triple interaction between years of experience, whether an employee works at a facility without AC, and temperature. The other three models are replicas of the temperature interaction models in Table 1 but filter the data to only include employees with less than 2, 4, and 6 years of experience, respectively. All data is from before the COVID-19 pandemic.

		Years of Experience:		
	Triple Interaction	<= 1	<= 3	<= 5
No AC	1.30	1.28	1.39	1.19
	[0.92; 1.84]	[0.84; 1.96]	[1.00; 1.94]	[0.88; 1.60]
Temp.	1.00	1.01*	1.01*	1.00*
	[1.00; 1.01]	[1.00; 1.01]	[1.00; 1.01]	[1.00; 1.01]
No AC * Temp.	1.00	1.00	1.00	1.00
	[1.00; 1.01]	[0.99; 1.01]	[0.99; 1.00]	[1.00; 1.01]
No AC * Years Experience	0.97			
	[0.94; 1.01]			
Temp. * Years Experience	1.00			
	[1.00; 1.00]			
No AC * Temp. * Years Experience	1.00			
	[1.00; 1.00]			
Unemployment Rate	0.98*	0.99	0.98	0.98
	[0.97; 1.00]	[0.96; 1.01]	[0.96; 1.00]	[0.96; 1.00]
White	1.25*	1.32*	1.31*	1.29*
	[1.21; 1.29]	[1.26; 1.38]	[1.26; 1.37]	[1.24; 1.34]
Monthly Salary ($1k)	0.69*	0.81*	0.71*	0.67*
	[0.67; 0.72]	[0.77; 0.86]	[0.68; 0.74]	[0.65; 0.70]
Age	0.90*	0.96*	0.95*	0.94*
	[0.89; 0.91]	[0.95; 0.97]	[0.94; 0.96]	[0.93; 0.95]
Age^2	1.00*	1.00*	1.00*	1.00*
	[1.00; 1.00]	[1.00; 1.00]	[1.00; 1.00]	[1.00; 1.00]
Male	0.88*	0.87*	0.87*	0.88*
	[0.85; 0.91]	[0.84; 0.91]	[0.84; 0.91]	[0.85; 0.91]
3 months before raise	0.96	0.94	0.97	0.96
	[0.91; 1.02]	[0.87; 1.02]	[0.91; 1.04]	[0.90; 1.02]
3 months after raise	0.83*	0.81*	0.82*	0.82*
	[0.79; 0.88]	[0.75; 0.88]	[0.77; 0.88]	[0.77; 0.87]
Pct staffing change	0.99*	1.00	0.99*	0.99*
	[0.99; 1.00]	[0.99; 1.00]	[0.99; 1.00]	[0.99; 1.00]
Year built	1.00	1.00*	1.00	1.00
	[1.00; 1.00]	[1.00; 1.00]	[1.00; 1.00]	[1.00; 1.00]
N incarcerated (100)	1.01*	1.01*	1.01*	1.01*
	[1.00; 1.01]	[1.01; 1.01]	[1.01; 1.01]	[1.01; 1.01]
Tenure FE				
Cubic Time Trend	✓	✓	✓	✓

* Null hypothesis value outside the confidence interval.

Figure B.2 – Departures from Prisons Without AC More Likely Among Less Experienced Shows the predicted probability of departing for correctional officers employed in facilities with and without air-conditioning by years of experience working for the TDCJ. Control variables are set to their means. The Law Enforcement and Custodial Officer (LECO) Supplemental Retirement Fund provides a lifetime annuity for eligible employees who have 20 years of experience, which likely explains the spike in departure rates beginning at 19 years of experience.



C Pack Unit Analysis

Figure C.1 – Number of Frontline Correctional Officers Employed in the Pack Unit The dashed line indicates the installation of air-conditioning in the facility.

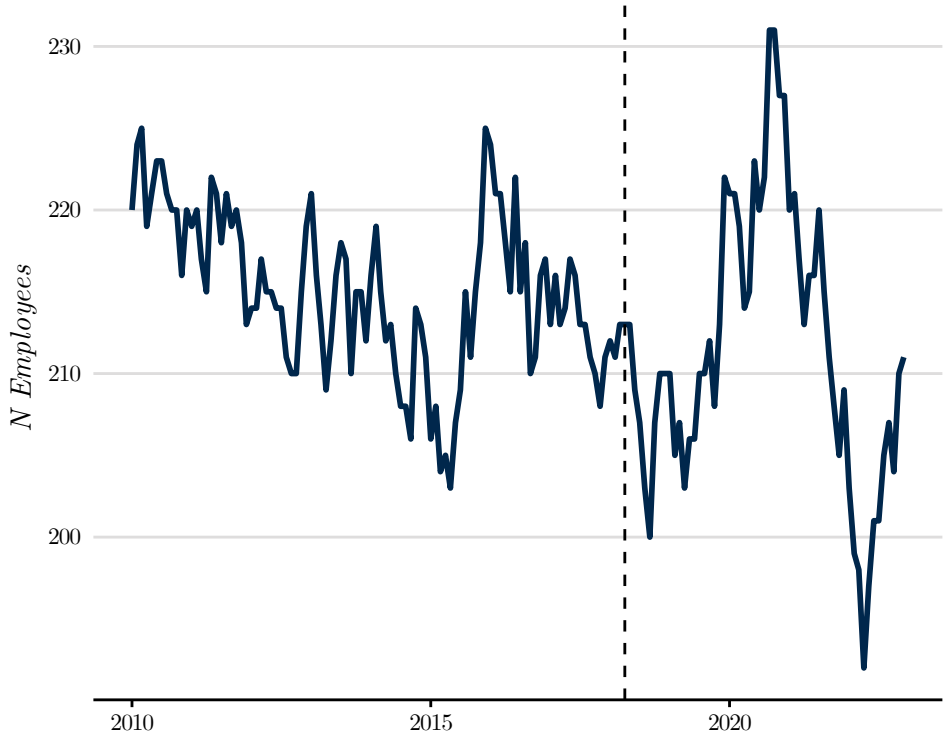


Table C.1 – No Evidence Installing AC in Pack Unit Decreased Departures Shows the results of a logit model testing whether departures decreased from the Pack unit following the installation of air-conditioning in April 2018 due to a court order. Post period includes months up to December 2022. Coefficients displayed as odds ratios with 95% confidence intervals in parentheses.

Pack * Post-Installation	1.20*
	[1.02; 1.41]
Pack	0.78*
	[0.69; 0.87]
Post-Installation	0.86*
	[0.80; 0.92]
Tenure FE	✓
Cubic Time Trend	✓
Controls	✓

* 1 outside the confidence interval.