Analyzing the Efficacy of Home Electronic Incarceration on Return-to-Custody Rates for Inmates During the COVID-19 Pandemic

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McBride Kauders Rawson

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Technical Project Team Members

Josh Dornfeld

Imani Hankinson

Livia Hughes

Sarah Murphy

Ronica Peraka

On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

Michael Smith, Department of Systems and Information Engineering

K. Preston White, Department of Systems and Information Engineering

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Josh Dornfeld, Imani Hankinson, Livia Hughes, Sarah Murphy, Ronica Peraka, McBride Rawson, Loreto Peter Alonzi III, Neal Goodloe, Michael Smith, K. Preston White, *IEEE*

Abstract— **Home Electronic Incarceration (HEI) is a tech-enabled alternative allowing the Albemarle-Charlottesville Regional Jail (ACRJ) to monitor individuals outside the correctional facility. Carefully selected individuals are allowed to serve their sentences within the boundaries of an approved location. In response to the COVID-19 pandemic, local courts and ACRJ adjusted sentencing and incarceration practices to reduce jail occupancy and limit the spread of coronavirus (N. Goodloe, personal communication, September 12, 2022). We wish to explore whether the increased use of HEI affected the return to custody (RTC) at ACRJ.**

These methods consist of comprehensive, quantitative analysis of booking data provided by ACRJ, in conjunction with continued insight and guidance from Region Ten Community Services (locally known as "R10", a provider of mental health resources), Offender and Aid Restoration- Jefferson Area Community Corrections (OAR-JACC) and the Blue Ridge Area Coalition for the Homeless (BRACH). This paper presents results of ACRJ inmate outcomes within two areas of focus: HEI sentences pre- vs. post-COVID and HEI vs. non-HEI individuals during and since the onset of COVID. In addition to this analysis, we have collaborated with key community stakeholders to better understand the state of the Albemarle-Charlottesville criminal justice system as it recovers from the pandemic.

We found that prior to the onset of the pandemic, HEI was reserved for frequent offenders who typically were serving felony charges. After the beginning of the pandemic, ACRJ began placing individuals on HEI who were more representative of the jail population as a whole in terms of prior criminal history and the mix of misdemeanor and felony offenders. We also demonstrated that individuals on HEI are incarcerated for significantly extended periods for comparable offenses than those who serve their sentence in ACRJ, as individuals in jail can get days off of their sentence for good behavior, while HEI participants are ineligible for such time credits. Finally, our analysis of RTC rates at ACRJ shows that HEI results in lower RTC rates than traditional jail sentences, pre- and post-COVID, and when split between misdemeanor and felony offenses. This analysis provides strong evidence for the efficacy of HEI as an alternative to incarceration in our local community, which may give an example for other jurisdictions to adopt or expand HEI usage in the future.

I. INTRODUCTION

Americans account for 25% of the global inmate population, but only represent 5% of the world's population (LeMasters *et al.*, 2022). During the COVID-19 pandemic, efforts to reduce the risk of contagion among staff and the jail population led ACRJ and the broader criminal justice system to adjust its sentencing, incarceration, and treatment practices. Among these adjustments was the increased use of home electronic incarceration (HEI). HEI allows carefully-selected offenders to await trial or serve sentences outside of a correctional facility, with constant monitoring from a tracking device (typically an ankle bracelet) within virtual boundaries. Depending on the level of confinement, individuals on HEI may serve their sentences entirely at home or leave their residence only under specific conditions, such as for employment or to receive mental or physical health care.

Beyond reducing the risk of contagion, HEI has many benefits, including improved mental and medical health, decreased violence in prisons, and positive impacts on the children of participants (Incorporated, 2022). At ACRJ, the savings in bed day expenditures were more than sufficient to allow the jail to recover the monitoring cost post-COVID period (after April 1, 2020).

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Because of the comparatively low use of HEI technology and consequent lack of data pre-COVID (before April 1, 2020), it is unknown whether there is any relationship between ACRJ's increased use of HEI and the likelihood of an individual's return to custody. This study aims to determine whether ACRJ's criminogenic risk assessment accurately identifies individuals unlikely to compromise public safety. The results of this analysis will assist policymakers in creating a list of "qualifying criteria" for future HEI assignments. This evaluation may affect the return to custody risk assessment accuracy and whether HEI is a suitable incarceration alternative for individuals.

II. METHODOLOGY

A. Data Security Procedures

This project contributes to an ongoing series of studies sponsored by the Jefferson Area Community Criminal Justice Board (JACCJB) with direct support from Neal Goodloe, the Criminal Justice Planner. As with the previous projects in this series, a project team at the University of Virginia cleaned and analyzed all data. To ensure proper data usage, the data protocol was required to meet the Virginia Institutional Review Board for Health Sciences Research (IRB-HSR) criteria. This includes completing Collaborative Institutional Training Initiative (CITI) training, storing all identified data on a secure server, and signing non-disclosure agreements (NDAs) with all organizations involved. The CITI Training consisted of training regarding prisoners and individuals receiving mental health services. The secure server at the Ivy Secure Computing Environment is only accessible with the combination of specific UVA credentials, UVA High-Security VPN access, and access through a Microsoft Remote Desktop. Because of the sensitivity and confidentiality of the data provided by clients to the project team, use and non-disclosure agreements were executed. Maintaining trust and confidence with the leaders in the local Albemarle/Charlottesville criminal justice agencies is critical to understanding the responsibilities and functions of the organizations, in addition to maintaining long-standing relationships. One of the significant challenges of conducting this type of research is the need to gather and combine data from multiple agencies that do not share the same platforms and data systems. The complex processes required to obtain the data needed for this project are one of the key reasons why research of this nature is rarely done.

B. Data Acquisition and Merging

The original ACRJ dataset span approximately seven years, dating from January 1st, 2014, through December 9th, 2021. This dataset consists of booking information for every person processed at ACRJ. Each entry in the dataset is a booking into the ACRJ system. Once the dataset was obtained, specific columns of private information were removed from the dataset so that analysis could be performed without revealing any personally identifiable information (PII). This process ensures the privacy and protection of personal information from ACRJ. This PII removal process was replicated with a new data update the team requested, spanning from December 9th, 2021, through December 14th, 2022. Once all PII was removed, the two datasets were merged. All duplicate entries, duplicate booking numbers, and weekend entries were removed. "Weekenders" only serve their jail sentences on weekends and thus do not provide useful and comparable data to those serving full-time sentences. This "base" dataset includes ACRJ-provided information: booking number, booking date, jacket number, release date, release reason, sentence status, statute, statute description, felony/misdemeanor classification, reference number, age, gender, and race. The result is a cleansed dataset of 32,353 bookings. The "sentences" dataset was created by refactoring the booking entries for each entry to represent a unique crime sentence since one sentence might consist of several bookings into and out of jail. For example, an individual committing a misdemeanor DWI and serving part of their sentence on HEI might result in 2 bookings (one booking into the jail until release to HEI and one booking on HEI until the sentence is served). Separate bookings were considered to be part of the same sentence if the jacket number, statute, and dates matched exactly. The information in the sentences

dataset is the same as the base dataset, simply refactored. The result was a dataset of 30,464 sentences. Together, the data from and relationships with these organizations have allowed us to examine and evaluate inmate outcomes and trends related to HEI.

C. Research Goals and Analysis

The research aims to analyze the efficacy of Home Electronic Incarceration on return to custody rates throughout the COVID-19 pandemic. Ultimately, the aim is to determine whether HEI leads to better outcomes than custodial incarceration for comparable criminogenic behavior. To evaluate post-release outcomes, this analysis addresses trends in the following areas:

1. Pre- vs. Post-COVID use of HEI
2. Characteristics of HEI vs. Non-HEI individuals during COVID and since

Given the more extensive use of HEI during and following the COVID-19 pandemic, this analysis addresses these outcome related questions:

1. How has HEI incarceration at ACRJ been impacted by the COVID-19 pandemic?
2. Which inmates are offered the HEI option versus custodial incarceration?
3. Are inmates (pretrial and sentenced) who participate in HEI post-COVID more likely to return to custody than inmates with similar crimes who are being held in ACRJ?

III. RESULTS

This analysis compares HEI sentences pre-COVID (before April 1st, 2020) and post-COVID to see how HEI usage changed at the onset of, and during, the pandemic. Of the 641 HEI sentences, 216 were pre-COVID, and 425 were post-COVID. Additionally, comparisons are made to the full sample of 30,464 sentences pre- and post-COVID to determine whether changes were seen in the HEI usage mirror or contradict changes in the full jail.

Sentence Demographic Information				
	Pre-COVID 1/1/14 to 3/31/20		Post-COVID 4/1/20 to 12/14/22	
	HEI n=216	Full Sample n=24,178	HEI n=425	Full Sample n=6,286
Average Age	37.9	35.5	36.4	37.7
Male/Female Split	81/19	80/20	78/22	79/21
%White	41%	60%	54%	63%
%Black	59%	39%	44%	36%

Fig. 1. Sentence Demographic Information. HEI usage post-COVID sees a higher ratio of white to black participants.

Figure 1 illustrates the demographic factors for all sentences at ACRJ, HEI, and otherwise, and how they changed pre- to post-COVID. The results indicate that the average age and sex distribution of individuals on HEI remained essentially unchanged. Still, there was a notable change in the racial makeup of the individuals receiving HEI sentences. The post-COVID period saw a 13% increase in the proportion of white participants and a 15% decrease in the proportion of black participants on HEI. In this same period, the findings also revealed a 3% increase in all jail sentences for white individuals, whereas black individuals experienced a 3% decrease in all jail sentences. This general trend in the jail helps explain in part the change seen in HEI, but further analysis is required to explain the discrepancy.
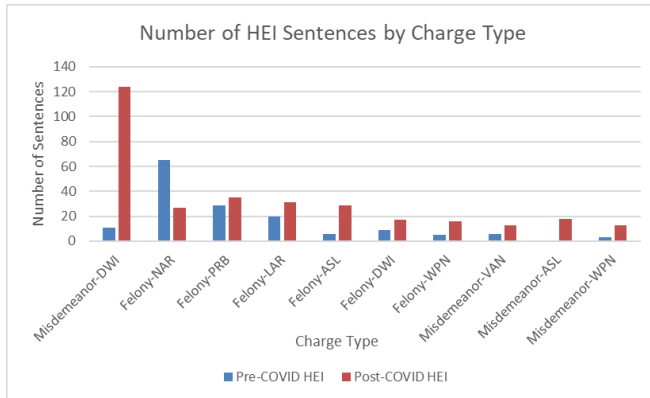
Fig. 2. HEI Sentences by Charge Type. The HEI policy shift post-COVID altered what charges typically result in HEI sentences.

Figure 2 provides insight into the charge type distribution for HEI Sentences at ACRJ pre- and post-COVID. The ten most common charge types for which HEI is utilized were selected for analysis. The results show a significant shift in the types of offenses that result in HEI sentences, which has potential implications for the criminal justice system and the individuals impacted by these sentences. Notably, Felony Narcotics charges accounted for 30% of all HEI sentences pre-COVID but only 6% of HEI sentences post-COVID. In contrast, Misdemeanor Driving While Intoxicated (DWI) in HEI sentences increased from 5% pre-COVID to 29% post-COVID, indicating a notable increase in the use of HEI sentences for this offense. Furthermore, Misdemeanor Assault is the 6th most common HEI charge type post-COVID, despite not being considered for HEI sentences pre-COVID. Half of these are for "Domestic Assault - Simple" and the other half for "Simple Assault - Citizen."
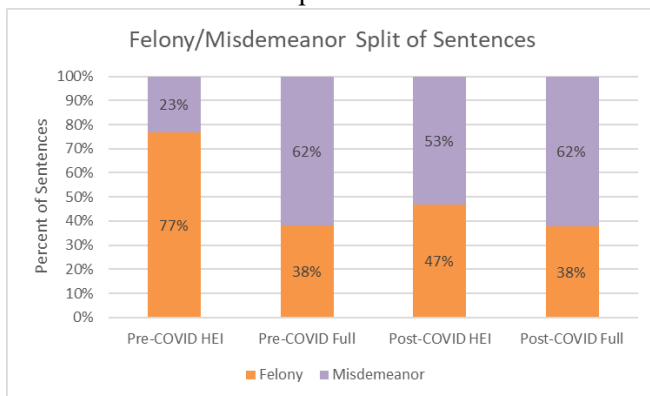

Fig. 3. Felony/Misdemeanor Split of Sentences. Felony charges dominated HEI usage pre-COVID.

Figure 3 displays the felony and misdemeanor rates for HEI and overall sentences at ACRJ pre- and post-COVID. These findings indicate a 30% drop in HEI sentences for felony charges, with 77% of HEI sentences pre-COVID being for felony charges but only 47% post-COVID. Notably, this shift is not reflected in ACRJ sentences (HEI and non-HEI combined), where the percentage of felony and misdemeanor sentences pre- and post-COVID remains unchanged. These results suggest that HEI is being used more frequently for less severe offenses post-COVID while still having a higher proportion of felony offenders than misdemeanor offenders when compared to ACRJ sentencing overall.
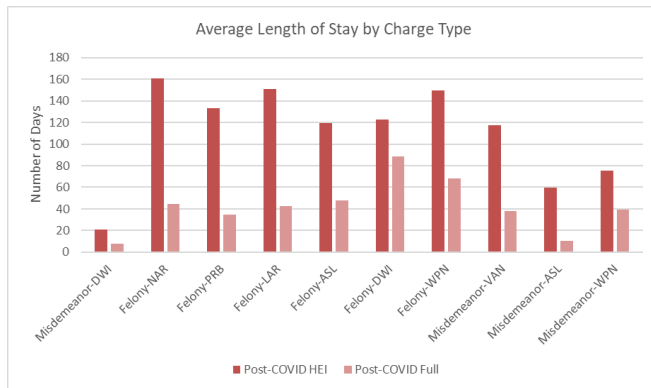
Fig. 4. Average LOS by Charge Type. Inmates spend much longer on average on HEI than comparable inmates in the jail.

The findings presented in Figure 4 highlight the significant differences in the average length of stay between HEI and non-HEI sentences for comparable crimes. Individuals serving their sentence in ACRJ are eligible for time credits of up to 50% off their sentence length for good behavior in jail. By comparison, HEI participants must serve 100% of the portion of their sentence served on HEI. This is evident in the data, which shows that for the ten most commonly used charges for HEI sentences at ACRJ, the average length of stay incarcerated was ~3x as long for HEI sentences as non-HEI sentences. While specific individuals might benefit from an HEI environment, they will have to serve longer than if they had stayed in jail. This also shows why individuals might reject going on HEI, electing to remain in jail for the prospect of a shorter sentence length.
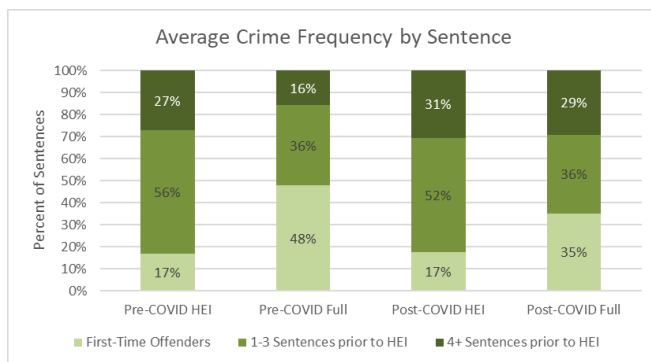

Fig. 5. Crime History of HEI Participants. Changes seen in the full jail are not reflected in HEI sentences.

Figure 5 provides insight into the distribution of first-time, occasional, and frequent offenders and their assignments to HEI. The data shows that there was no significant difference in the usage of HEI for differing crime frequency groups pre- and post-COVID. Among HEI participants, 17% were first-time offenders, with most HEI opportunities reserved for those with 1-3 prior offenses. The average number of prior sentences for pre- and post-COVID HEI is 3.1. However, on average, the total jail database has more prior sentences post-COVID than pre-COVID. (This could simply result from more passage of time and thus more opportunity for crime.) This suggests that prior to the pandemic, HEI was reserved for more occasional (1-3 prior) and frequent (4+ prior) offenders compared to the overall jail population. Since the onset of COVID, the proportion of frequent offenders on HEI more closely resembles the jail population as a whole, with the proportion of occasional offenders still over 50% of sentences. These findings also may shed light on the race discrepancies in HEI sentencing uncovered in Figure 1. On average, individuals identified as black had 0.6 more prior sentences than those identified as white pre-COVID. As repeat offenders were prioritized for HEI sentencing pre-COVID, this may have led to the selection of more black individuals due to their criminal history.

To explore the efficacy of HEI and assess the success of ACRJ's HEI implementation post-COVID, we measure the return to custody for HEI and non-HEI sentences booked before or after April 1, 2020. The results below show a lower return to custody for HEI sentences versus non-HEI sentences, with that pattern generally remaining the same when controlling for charge severity (felony and misdemeanor).

	6-Month Window		12-Month Window	
	Misdemeanor	Felony	Misdemeanor	Felony
HEI	26.00% 13/50	15.06% 25/166	44.00% 22/50	20.48% 34/166
Non-HEI	34.64% 5155/14882	35.80% 3241/9054	43.29% 6443/14882	46.52% 4212/9054

Fig. 6. Pre-Covid Return to Custody Rates. Felony RTC rates, in particular, are significantly lower for HEI sentences when compared to non-HEI sentences.

Figure 6 provides essential insights into the RTC rates for all pre-COVID bookings, showing that HEI 6-month RTC is 20% lower for felonies and 8% lower for misdemeanors, while HEI 12-month RTC is 26% lower for felonies but 0.71% higher for misdemeanors. However, we should note the relatively small sample size of only 50 HEI misdemeanor sentences. Overall, all pre-COVID HEI sentences have a 17.59% 6-month RTC, 18% lower than non-HEI sentences, and a 25.93% 12-month RTC, 19% lower than non-HEI sentences.

	6-Month Window		12-Month Window	
	Misdemeanor	Felony	Misdemeanor	Felony
HEI	17.20% 32/186	25.68% 38/148	25.00% 35/140	32.35% 44/136
Non-HEI	33.18% 935/2818	30.60% 522/1706	41.32% 883/2137	42.07% 578/1374

Fig. 7. Post-Covid Return to Custody Rates. HEI RTC rates are lower across the board post-COVID.

Figure 7 shows the RTC rates for post-COVID bookings with releases within a 6 or 12-month window of the end of the data set (December 14, 2022). The HEI 6-month RTC rate is 5% lower for felonies and 16% lower for misdemeanors. HEI 12-month RTC is 10% lower for felonies and 16% lower for misdemeanors. All HEI rates were calculated from larger sample sizes of 136-186, increasing our confidence in these rates. Overall, all post-COVID HEI sentences have a 20.90% 6-month RTC (12% lower than non-HEI sentences) and 28.62% 12-month RTC (13% lower than non-HEI sentences). Comparing pre- and post-COVID return to custody, the 6-month RTC rates show that non-HEI felony RTC rates decreased by 5.2% and misdemeanor RTC rates decreased by 1.5%. On the other hand, for HEI, felony RTC increased by 10.5%, while misdemeanor RTC decreased by 8.8%. While many factors might explain these discrepancies, such as the necessity to compare different populations across many years, these RTC findings imply that HEI has been more successful post-COVID for misdemeanor offenses than felony offenses when compared to HEI usage pre-COVID.

Charge Type	Total HEI Sentences	Non-HEI RTC Rate	Expected RTC	Actual RTC	Difference
Misdemeanor-DWI	99	30.49%	30.2	11	-19.2
Felony-PRB	32	35.31%	11.3	10	-1.3
Felony-ASL	24	26.03%	6.2	5	-1.2
Felony-LAR	24	45.23%	10.9	8	-2.9
Felony-NAR	17	33.42%	5.7	4	-1.7
Misdemeanor-ASL	16	28.03%	4.5	8	3.5
Misdemeanor-VAN	12	27.59%	3.3	3	-0.3
Felony-DWI	10	33.33%	3.3	0	-3.3
Misdemeanor-WPN	10	17.86%	1.8	3	1.2
Felony-WPN	9	20.34%	1.8	3	1.2
...	...	...	...	...	...
(35 more rows)					
Total	335		101.5	70	-31.5

Fig. 8. Post-COVID HEI Expected 6 Month Return to Custody Sentences by Charge Type. The HEI RTC rate is lower than expected when controlling for charge type.

To compare HEI RTC rates more directly with non-HEI, it makes sense to control for charge type, as different charges have different RTC rates, and the distribution of charge type is significantly different between HEI and non-HEI post-COVID. Figure 8 shows how we controlled for charge type to estimate the number of HEI cases that one would expect to RTC by assuming the non-HEI RTC rates to be true and multiplying that rate by the total number of sentences by that charge to find the expected RTC count per charge type. We then totaled the expected RTC counts and actual RTC counts to find expected and actual RTC rates for post-COVID HEI. Of the 335 HEI sentences, the expected RTC rate based on charge type RTC is 30.29%, while the actual RTC rate was nearly a third (10% lower) at 20.90%. We would like to note that Misdemeanor-DWI accounts for 19 of the nearly 32 sentences, or 60.3%, that one would expect to return to custody but did not actually.

Charge Type	%HEI / %Non-HEI	% of All HEI Sentences	n	% of All Non-HEI Sentences	n
Misdemeanor-DWI	1.84	29.6%	99	16.0%	597
Felony-ASL	1.83	7.2%	24	3.9%	146
Felony-NAR	0.52	5.1%	17	9.8%	365
Felony-DWI	6.17	3.0%	10	0.5%	18
Misdemeanor-WPN	1.98	3.0%	10	1.5%	56
Misdemeanor-PRT	0.47	2.1%	7	4.4%	164
Misdemeanor-CON	0.16	1.8%	6	11.3%	422
Misdemeanor-ASP	3.70	1.2%	4	0.3%	12
Felony-ARR	0.19	0.6%	2	3.1%	115
Felony-MUR	4.44	0.6%	2	0.1%	5

Fig. 9. Charge Types on Post-Covid HEI that are Significantly Over or Underrepresented. DWI is widely overrepresented on HEI.

Figure 9 shows ten charges that are over- or under- represented on post-COVID HEI when compared to the full jail. These findings provide insight into specific charges that ACRJ was prioritizing in assigning to HEI post-COVID. Most notably, both misdemeanor and felony DWI are overrepresented in HEI sentences. Felony Narcotics, which made up 30% of pre-COVID HEI sentences, is now underrepresented post-COVID when compared to the full jail.

IV. IMPLICATIONS AND CONCLUSION

This research focuses on the impacts of HEI at ACRJ both pre- and post-COVID. Data analysis efforts supported by the CCJB revealed significant findings with potential implications in the following areas:

A. *Sentence Demographic Information:* When a new program is implemented, especially in criminal justice, it is essential to see if it is being offered equitably. The results suggest a shift in the distribution of HEI sentences across races, which may have implications for equity and fairness at ACRJ. This shift might be explained in part by placing

less frequent offenders and more misdemeanor offenders being placed on HEI, but due diligence is required in this regard.

B.	*HEI Sentences by Charge Type:* The increase in DWI HEI sentences on HEI occurred during a time where few people were on the roads during the pandemic, which indicates a clear crime charge priority of ACRJ HEI. In looking at sentences for those who are serving domestic assault, it is unclear why individuals were sent back to the scene of the crime on HEI post-COVID. This has serious implications for both the offenders and the victims.

C.	*Felony/Misdemeanor Split of Sentences:* The findings indicates that the pandemic may have led to a change in the way that justice is being served for certain types of offenders. Additionally, the findings may suggest that judges are opting for HEI sentences more frequently for misdemeanor offenders post-COVID, as a means of reducing the risk of COVID-19 transmission in ACRJ.

D.	*Average LOS by Charge Type*: The findings highlight significant differences in the average length of stay between HEI and non-HEI sentences for comparable crimes. While some individuals may thrive in an HEI environment, others may elect to stay in jail in order to have the prospect of a shorter sentence length. These findings highlight the need for an individualized approach to sentencing, taking into account an individual's circumstances. Sentencing policies should be designed to promote rehabilitation and reentry into the community, while ensuring equity in the criminal justice system and public safety.

E.	*Crime History of HEI Participants*: The implications of these findings are significant, particularly in terms of addressing racial disproportionality at ACRJ. HEI was previously reserved for more frequent offenders. At ACRJ, black inmates have more prior crime sentences on average, which might have led to a large proportion of HEI sentences pre-COVID. However, the post-COVID data indicates that HEI participants now have a similar criminal history to the overall jail population, indicating that ACRJ casted a wider net for HEI participants in terms of crime history.

F.	*Pre-Covid Return to Custody Rates*: The findings suggest that HEI may be an effective alternative sentencing program for certain types of offenses, particularly felonies. The lower RTC rates for HEI sentences, particularly for felonies, suggest that HEI may be an effective alternative to traditional jail sentences for certain types of offenses. This is important given the high recidivism rates among individuals who have served time in jail, highlighting the need for alternative approaches to incarceration.

G.	*Post-Covid Return to Custody Rates*: The findings suggest that HEI sentences may have a positive impact on reducing RTC rates for certain types of offenses, specifically misdemeanors. While the 6-month RTC rate increased for HEI felony sentences, the rate decreased for HEI misdemeanor sentences. This is further evidence that pre-COVID and post-COVID HEI at ACRJ are two completely different population groups with different characteristics, and thus comparisons between the two are difficult. When compared to the total jail RTC rates post-COVID, it appears that ACRJ succeeded in identifying misdemeanor offenders who would succeed on HEI, but needs to reconsider the felony offenders that are assigned to HEI as the RTC rate was only slightly lower for HEI than non-HEI.

There are several potential limitations that apply to this research study. Firstly, this study has a limited sample size due to the number of individuals serving their sentences on HEI through ACRJ, which could affect the generalizability of the study; the results may only apply to this specific facility and may not be applicable to other facilities or jurisdictions. The limited sample size of 50 data points for HEI misdemeanor sentences suggests that further research is needed to fully understand the impact of HEI on RTC rates for less severe offenses. Second, systematic errors in the collection, analysis, or interpretation of data collection can impact the accuracy of the findings in this research study. Finally, it is important to acknowledge that the individuals being offered HEI are a subset of the general jail population, consisting of mostly non-violent offenders, sentences of under two years, and living within the three jurisdictions served by ACRJ (Albemarle, Charlottesville, and Nelson). In addition to these criteria, HEI participants were handpicked by ACRJ and had to elect to go on HEI. This subset of the population might be predisposed to post-release success regardless of HEI.

Moving forward, to perform further work and research, it is essential to compile a larger database including specific information on HEI usage. One area of interest to explore in the future is the effect of HEI on populations that are screened in vs. screened out using the brief jail mental health screener (BJMHS). There is insufficient data in the current databases since HEI is relatively newly implemented. There are 153 people who are recorded for both taking the BJMHS and being on HEI, which is less than 3% of the total number of individuals recorded taking the BJMHS. Prior work in this series of studies

sponsored by the JACCJB has already uncovered significant trends and action items regarding mental health in ACRJ. These findings are reserved for within the jail and not for those on HEI.

With comprehensive data, future research can investigate critical questions such as the following: What are the key differences between individuals on HEI that are linked to mental health resources, such as R10, compared to those who are not? How does HEI improve or exacerbate mental health conditions when compared with a sentence served in ACRJ? How does HEI impact crime trends and long-term return to custody rates? These findings ultimately provide decision-makers with valuable insights for supporting inmates on HEI and aid the Evidence-Based Decision Making (EBDM) team in making informed decisions regarding the ACRJ population, specifically those on HEI.

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