

Mixed signals: The effect of employment training on employment outcomes for previously incarcerated individuals

Introduction

Though unemployment and subsequent job searches are difficult for many people (see Paul and Moser 2009), they are especially arduous for individuals with a history of incarceration. People returning from carceral settings face exceptional difficulty finding employment due to gaps in labor force participation (Apel and Sweeten 2010), a lack of technological literacy due to access restrictions during incarceration (Western, Kling, and Weiman 2001), discrimination by employers (Ahmed and Lång 2017; Baert and Verhofstadt 2015), and other related issues. The financial strains of unemployment are especially burdensome when paired with the fees associated with parole, and the consistent rejection associated with the job search can have negative impacts on the mental and physical health of reentrants (Cantora 2015). Further, the U.S. economy incurs costs associated with failed job searches for reentrants—the estimated annual loss in Gross Domestic Product (GDP) due to the under- or unemployment of individuals with a criminal history is estimated to be between \$57 and \$65 billion (Schmitt, Warner, and Gupta 2010). Investing in the success of reentering populations in the job market is a crucial endeavor for those directly and indirectly affected by the labor market contributions of formerly incarcerated individuals.

Efforts to improve employment outcomes for reentrants have included substantial investment in employment-related trainings that build soft skills—defined as intra- and interpersonal abilities to interact effectively with others—and human capital—defined as the economic value of a worker’s experience and skills (Becker 1962). Outside of the skill-building value of training, economists and social scientists have hypothesized that there may be other

intangible benefits to employment training; specifically, training participation may act as a signal, or a sorting mechanism used to discern which individuals are high quality workers. The goal of this research is to explore whether and how two potential theoretical mechanisms—namely, human capital theory and signaling theory—explain employment outcomes for individuals with a criminal history that participate in employment training. Understanding the devices that drive outcomes for individuals that participate in employment training can improve the efficacy of these programs and, in turn, best facilitate positive outcomes for individuals with a criminal history looking for work.

Human capital theory and signaling theory emphasize two different channels that can improve individual employment outcomes. According to human capital theory, reentrants that have completed employment training are more likely to be employed and earn higher wages because of an increased value to employers based on new skills or experience they have attained (Becker 1962). Signaling theory, conversely, hypothesizes that skill accumulation is not the driving force of employment outcomes. Rather, a person with a history of incarceration who completes employment training is more likely to be employed and earn higher wages because they have provided a signal of their ability to perform the tasks of a job relative to other individuals who did not complete training (Spence 1973). Though both theories predict that employment training improves employment outcomes, the underlying mechanisms are dramatically different and have dramatically different implications for successful program implementation.

While these two theories are not mutually exclusive, the purpose of this research is to discern the viability of the two theories in the context of employment training for reentrants. If the analysis provides evidence in favor of human capital theory, meaning training actually

improves the underlying capabilities of trainees, these programs should be made as accessible as possible to workers of all skill levels. However, if signaling is the primary mechanism underlying employment outcomes, employment training will be used disproportionately by high ability workers in order to signal that they are not low ability, even if training has no actual value beyond this signal.

Literature Review

Employment Training Participation for Justice-Involved Populations

There is a rich literature devoted to examining the relationships between incarceration and post-release outcomes. A variety of research has shown that employment contributes to financial stability (Travis and Petersilia 2001), development of prosocial networks (Wright and Cullen 2004), and the construction of prosocial identities of reentering populations (O'Brien 2001; Opsal 2012), all of which contribute meaningfully to desistance. However, not all employment is unilaterally beneficial; higher quality jobs (Uggen 1999) that are stable (Ramakers et al. 2017) are more likely to elicit desistance. In short, this body of research confirms that employment can directly and indirectly improve the well-being of reentrants and the communities to which they return.

Despite the consensus regarding the benefits of employment for justice-involved populations, there is less unanimity regarding which mechanisms improve employment prospects for previously incarcerated individuals. Programs that incorporate transitional periods of work for justice-involved groups have been largely ineffective at improving employment outcomes. For example, Community Restitution Apprenticeship-Focused Training (CRAFT), a 6-month vocational program for substance-involved juvenile offenders, produced higher rates of employment and general educational development (GED) attendance, but no meaningful effect

on months employed, hours worked, or hourly wage (Schaeffer et al., 2014). Another program, the Transitional Jobs Reentry Demonstration (TJRD), offered a temporary minimum wage jobs as well as access to employment classes, job coaching, job search assistance, and job placement services to randomly assigned participants leaving prison in four cities in the Midwestern United States. Though preliminary results revealed that that the program substantially increased employment in the first quarter of the study (i.e. during the time men were provided transitional employment), these gains faded as men left transitional work. Only about one fifth of the treatment and control group were employed with no statistically significant differences between the two groups; further, there was no impact on measures reflecting recidivism (Jacobs 2012). A similar intervention in New York City, the Center for Employment Opportunities (CEO), also provided temporary paid jobs and other skill-building programming to a randomly assigned group of re-entrants. Though the program did not demonstrate meaningful improvements in employment or earnings over time for the treatment group, it did meaningfully reduce recidivism measures after two years (Valentine and Redcross 2015). Meta-analyses and systematic reviews of a broad range of employment-based programming for individuals returning from carceral settings have determined no consistent effect of program participation on recidivism (Visher, Winterfield, and Coggeshall 2005) or the likelihood of employment (Newton et al. 2018).

In spite of these findings, evidence suggests that some employment programs improve outcomes for reentering individuals, including those that facilitate long-term relationships with employers. One such program, the EMPLOY program in Minnesota, provided reentrants with a job development specialist. This specialist preformed a number of tasks to facilitate long-term employment between each reentrant and potential employers, including 1) conducting location and vocation-specific job searches to find ideal potential employers for each participant, 2)

screening potential employers' policies to find places of work friendly to justice-involved people, 3) communicating with potential employers before the individual was released from incarceration, 4) informing each employer of potential tax credits and government benefits for hiring individuals with a criminal history, and 5) providing a reference for the incarcerated individual for the job opportunity available. Participants in this program saw increased odds of gaining post-release employment of 72% (Duwe 2012). Other programs that connected reentrants to permanent rather than short-term employment opportunities, saw similar gains; the Post-Release Employment Project (PREP), which involved an apprenticeship component before permanent job placement for previously incarcerated individuals, led to a 14% increase in the likelihood of employment (Saylor and Gaes 1994). These results are supported by other meta-analytic studies that uncover meaningful effects of vocational training related to recidivism estimates and positive employment outcomes (Bouffard, Mackenzie, and Hickman 2000; Davis et al. 2013).

The success of programs that develop long-term relationships and the failure of those that offer transitional employment may hint towards the mechanisms through which training programs could benefit formerly incarcerated individuals. As such, this work intends to examine two mechanisms that may explain this difference: human capital and signaling effects.

Human capital theory

Human capital theory accounts for variation in wages and employment outcomes across workers by differing investments in training and education, as training and education increase a worker's human capital, which increases their value to an employer (Becker 1964). Workers that accumulate more human capital earn higher wages because their marginal product—or their value to the employer—is relatively higher than those with lower amounts of human capital,

holding all other characteristics equal. To qualify for particular positions and earn particular wages, workers can acquire human capital to increase their marginal product.

Human capital theory has received mixed empirical support for individuals with a criminal history, especially related to the effects of education and training on employment outcomes. In research conducted by Ramakers and colleagues (Ramakers, van Wilsem, and Apel 2012), the authors compared the employment outcomes of two distinct samples—a group of previously incarcerated individuals and a group of individuals that were unemployed during the timeframe analyzed and later incarcerated (who they classify as unemployed future prisoners). The authors found that individuals that were previously incarcerated found employment more often and more quickly than unemployed future prisoners. Ramakers and colleagues (2012) hypothesized that this finding could be influenced by prisoner participation in vocational training, educational programs, or work experience accumulated in prison, illustrating support for human capital theory. In light of this conclusion, several studies have confirmed that groups of individuals with criminal records and incarceration histories are less likely to be contacted for an interview by an employer and eventually employed, even after controlling for educational attainment and employment history (Agan and Starr 2018; Ahmed and Lång 2017; Decker et al. 2015; Pager 2003). These findings suggest that human capital differences may not completely explain differences in employment outcomes for individuals with a history of incarceration.

In the context of the transitional or long-term models of training explored above, employment training programs will improve the likelihood that reentrants are hired by increasing their human capital. For example, reentrants with lengthy stays in carceral settings may lack the technological literacy necessary to complete simple tasks (Chappell and Shippen 2013). Thus, any training program (e.g. both transitional programs or ones that focus on long-term employer

relationships) that focus on improving technological proficiency will improve a reentrant's marginal product value by improving his or her skills related to perform work-related tasks, and therefore improve the likelihood that his or her marginal product is equivalent to the wage their employers will offer. This leads to the first hypothesis of this work:

Hypothesis 1: Employment training increases wages for individuals with a history of incarceration.

Signaling theory

Counter to human capital theory, signaling theory hypothesizes that the value of training and educational programming is not exclusively driven by human capital improvements. Rather, participation in training can help employers discern otherwise unobservable information about a worker—his or her ability and aptitude as an employee. Because hiring decisions are made in the absence of information regarding an employee's productivity and value to an employer, employers must depend on the observation of signals, or observable characteristics indicative of a worker's ability that he or she can manipulate (Spence 1973). Thus, individuals who complete employment training are more likely to have superior employment outcomes because they have effectively signaled their ability to reform and complete the tasks necessary for employment. For a program to act as an effective signal, it must incur some cost to the worker, and they must be more costly for a low-ability individual than a high ability individual to obtain. This is important in that it drives the establishment of a separating equilibrium in which a higher proportion of high ability workers participate in signaling as it is less costly for them to do so.

Few criminal justice researchers have given necessary attention to how reentrants can signal ability to potential employers. Of notable exception, Rukus and colleagues (2016) investigated the attributes of work release program completers relative to non-completers. The

underlying goal of this effort was to identify groups that are more likely to produce effective signals of desistance and productivity for employers on the job market. The authors found that reentrants that were older, white, and employed at time of arrest were more likely to complete a work release program than minority participants and those with prior mental health treatment. Additionally, in a piece investigating the value and meaning of work for parolees, Cherney and Fitzgerald (2016) found that reentrants often attempted to signal identity changes to potential employers. By asking a member of their social network to vouch for them to an employer during the job-search process, reentrants used these informal references to express a commitment to work. Finally, DeWitt and Denver (2019) used a signaling framework in order to assess the impact of credentials on employer perceptions of previously incarcerated individuals. Results of this work the positive effects of credentials—specifically supportive reference letters from former employers are able to mitigate most of the stigma from a criminal record, and this effect was persistent regardless of applicants’ racial identity and criminal history. If signaling theory is the chief mechanism underlying employment outcomes, these studies strongly imply that individuals with marginalized identities and less social capital will struggle to send signals related to their job readiness and employability. An accompanying empirical test of signaling theory against other potential hiring mechanisms (such as human capital theory) would provide support for these implications; however, no such test has been done.

Despite this empirical gap, many authors have identified the theoretical potential of signaling theory to explain labor market outcomes for reentrants, chiefly through participation in employment-related programming. Bloom (2012) explored the ways in which transitional job programs could conceivably improve employment and recidivism outcomes for individuals with a criminal record via signaling theory. Based on his assessment of the literature, Bloom

hypothesized that transitional job programs must find a way to boost the quality and magnitude of these signals, as studies show little to no effect of transitional job programs on employment or recidivism. In his policy piece, Maruna (2012) discussed important markers for effective signals. Specifically, he noted that it is important to differentiate between “cheap” and “authentic” signals, and that the best signals are ones that are the most costly to mimic. Finally, Bushway and Apel (2012) thoroughly outlined the ways in which signaling theory may uniquely apply to reentrants that participate in work-related programming, asserting that employment programs meet the criteria for effective signals for justice-involved populations. The current study can be considered an empirical test of whether signaling theory applies to reentrants in the way that Bushway and Apel (2012) suggest.

Empirical tests of signaling theory versus human capital theory can be challenging, as a positive relationship between employment training participation and employment outcomes are consistent with both theories. This work focuses on two relationships to disentangle human capital and signaling effects—specifically, the relationship between ability and training completion, and the relationship between ability, training completion, and wages.

According to signaling theory, individuals incur some cost related to attaining a signal, and the costs of signaling must be negatively related to a worker’s ability. That is, it should be more costly for a person with a low ability to signal his or her productivity than a person with a high ability, which leads to a lower number of low-ability applicants completing training relative to high ability applicants. This leads to the second hypothesis, unique to signaling theory:

Hypothesis 2: Low ability individuals with a history of incarceration complete less employment training than high ability individuals.

The third hypothesis investigates the relationship between worker ability, training completion, and wages. According to human capital theory, a worker's marginal product drives changes in employment outcomes. That is, workers benefit from training by increasing their production value relative to the wage offered at a particular position. Thus, trained workers with high ability will have the best employment outcomes when compared to untrained high ability, trained low ability, and untrained low ability individuals, as they are less likely to have a production value equal to or above the wage of the position that is offered. Conversely, signaling theory posits that the employer's observation of training participation, rather than an individual's production value, is the underlying mechanism driving employment outcomes. Thus, training participation should have a positive effect on an individual's employment outcomes regardless of his or her ability. As a result, an individual with low ability and an individual with high ability should benefit equivalently from training. This leads to the third hypothesis, unique to signaling theory:

Hypothesis 3: Training improves employment outcomes equivalently for high and low ability individuals with a history of incarceration.

The objectives of this work are twofold. First, this study intends to inform the application of these economic theories to justice-involved individuals. An empirical test of human capital and signaling theories will contextualize studies that utilize signaling theory and contribute to further theoretical developments in criminology and criminal justice. Second, this work will attempt to inform the creation of effective pre-employment programming for individuals who have a criminal history. The results of this analysis will hold implications related to both the practical development of effective trainings and programs and theoretical advancements for criminal justice writ large.

Methods

Data

Data used for this analysis are from the National Longitudinal Survey of Youth (NLSY) 1997, between the years 2000-2010. The NLSY is a panel dataset constructed from annual interviews of a cohort of individuals aged between 12 to 18 at the beginning of the survey. Individuals interviewed were between the ages of 15 and 21 in the year 2000, with an average age of 18. By 2010, the range of ages is 25 to 31. This time period is appropriate given that delinquency is known to peak in adolescence within the age range utilized in this research (Sampson and Laub 2005), and this is also the age when people begin working. However, this is also the time period in which educational decisions are most prescient. Controls related to total educational attainment and participation in schooling in the current year of analysis are included.

It is important to note that though the NLSY has been used regularly in criminological research, it is limited in its ability to speak to broader trends in incarcerated populations. To this point, the sample of individuals included in the NLSY was divided based on whether individuals had a history of incarceration for the purposes of this research. Specifically, an incarceration record variable is constructed using the individual's report of having been incarcerated during a given year. This variable takes a value of 1 in a particular year if a person was incarcerated in that year or in any previous year. Only a small portion of individuals in the sample experienced incarceration (4.57%), which should be noted as a limitation.

Dependent Variable

We utilize a worker's average income per week employed as a dependent variable to draw conclusions about an individual's wage. The survey question asked individual respondents about their earnings from wages, salary, commissions, or tips from their jobs earned in the

previous year, and this number was then divided by the number of weeks the individual reported being employed. Though human capital and signaling theory generally rely on a person's wage rather than their income, questions regarding wages had a high proportion of missing data. Given that our income per week estimate and wages were highly correlated ($r = .91$), income per week employed was considered to be an acceptable proxy.

Independent Variables

Testing human capital and signaling theory required measures of a worker's ability. The Armed Forces Qualification Test (AFQT) is operationalized as a measure of ability and aptitude, which has been widely utilized as a proxy for worker ability in economic models (see Arcidiacono, Bayer, and Hizmo 2010; Lang and Kropp 1986; Lang and Manove 2011; Nielsson and Steingrimsdottir 2018). The AFQT, comprised of both a verbal and mathematics segment, was administered to participants in the 1997 wave of the NLSY. Because signaling theory dichotomizes samples into high ability and low ability workers, this variable was operationalized to reflect an individual's placement in the distribution of AFQT scores. The AFQT variable takes a value of 0 when a person falls in the bottom half of the AFQT distribution, and 1 if they fall into the top half of the distribution.¹

The completion of employment training was operationalized through a dummy variable which took a value of 1 if an individual completed any employment training programs in a given year and 0 otherwise. Employment programs that qualified as training in this analysis included vocational, technical, or trade programs, apprenticeship programs, training in a vocational rehabilitation center, or job search or job placement training. This variable was then lagged in order to understand the effects of the previous year's program completion on employment outcomes in the current year.

This research also utilized a number of control variables based on individual characteristics. Given that race and gender have been shown to affect employment outcomes (Lang and Manove 2011; Nielsson and Steingrimsdottir 2017), this work also controls for the race and gender of the respondent. Specifically, the dummy variable “female” takes a value of 1 when the respondent is a woman, and the dummy variable “Black” takes a value of 1 when the respondent is African American.

Finally, as there is a longstanding relationship identified in the economics literature between earnings, work experience, and education (known as the Mincer earnings function) and controls for each of these factors are included (Mincer 1958; Lemieux 2006). An individual’s age at the time of the survey was included as a measure of potential work experience and educational attainment was included in the regressions to control for the Mincerian characteristics related to human capital and earnings. Education was divided into five categories, including less than a high school degree (1), high school degree or equivalent (2), some college (3), college or associates degree (4), masters, advanced, or professional degree (5).

Sample Characteristics

Before introducing our analytical strategy, Table 1 reports summary statistics comparing the previously incarcerated individuals in our dataset to those with no history of incarceration. As each regression in the following section is run on the sample of individuals without missing income data, we drop all individuals for whom income data is missing in Table 1. For each group, we report the proportion of agents receiving any training, the average income per week, and the fraction of weeks in which respondents reported being employed. These same variables are then reported for the subset of previously incarcerated individuals and those with no

incarceration history split across high and low ability respondents, measured as being in the top half or bottom half of the AFTQ distribution, respectively.

[TABLE 1 ABOUT HERE]

Several observations stand out from the statistics reported in Table 1. First, there are far more individuals in the NLSY dataset with no incarceration history ($n=47,144$) than those with a history of incarceration ($n=1,846$). Further, high ability individuals are underrepresented in the previously incarcerated population relative to the general population, with just 24.78% of the previously incarcerated falling in the high ability category compared to 47.92% of individuals with no history of incarceration. In general, individuals with no history of incarceration are more likely to seek training (13.12 % of respondents) than the previously incarcerated (9.81%). In line with Hypothesis 2, we see a lower proportion of low skill workers completing training than high skill workers, both in the subset of individuals with a history of incarceration and in the general population. While no cross-group differences in Table 1 are statistically significant, this provides suggestive evidence that workers treat training as a signal to employers.

With respect to employment related outcomes, we see that previously incarcerated individuals are employed for a lower percentage of the time (71.68% compared to 80.78%) and make less weekly income (\$337.73 compared to \$388.54) than those with no history of incarceration. However, ability appears to considerably moderate the negative impact of previous incarceration on income, with low ability individuals with a history of incarceration earning on average \$50 less per week employed than low ability individuals with no incarceration history (\$313.41 compared to \$363.37). For high ability workers, average income per week worked is nearly identical across the previously incarcerated (\$415.69) and those with no history of incarceration (\$415.88). However, the former group is less likely to be employed than the latter,

with high ability individuals with a history of incarceration being employed 75.21% of the year compared to 81.84% of the year for high ability respondents with no history of incarceration.

Analytic Strategy

The exploration of the first hypothesis includes three steps. First, we consider a pooled ordinary least squares (OLS) model with the full sample in the NLSY. This allows us to observe the effects of training in a general population as well as the effects of a history of incarceration. The second step involves an OLS regression with only individuals with a history of incarceration. Finally, we consider fixed effects (FE) regressions for the previously incarcerated sample. Given the nature of panel data, FE regressions are necessary to reduce the amount of serial autocorrelation. However, by design, FE regressions are unable to dissect the effects of time-invariant variables on the dependent variable—including, in this analysis, ability, gender, race, and other characteristics known to affect employment outcomes. An advantage of the OLS specification is the ability to observe the effects of variables which are fixed over an individual respondent's lifetime that likely contribute to employment outcomes (such as race, ability, and gender). A primary disadvantage of using OLS with panel data is potential unobserved heterogeneity at the individual level (a form of omitted variable bias) that may bias point estimates. Thus, the preferred specification is FE regression which controls for all unobserved, individual-specific factors that may influence the relationship between training, employment, and income. The second hypothesis is explored using a probit model of ability on training completion with both the full sample and the sub-sample of previously incarcerated individuals. Exploration of the third hypothesis utilizes FE specifications with separate regressions for previously incarcerated low ability and previously incarcerated high ability sub-samples. We then compare

these results to FE regressions for low ability and high ability individuals with no history of incarceration. This division will help delineate the differential effects of training on high and low ability individuals and, consequently, the relevance of signaling theory.

Results

Hypothesis 1

To investigate the first hypothesis, that employment training increases income per week for individuals with a history of incarceration, three separate regressions are considered. The first column of Table 2 reports OLS regression results for the full sample with weekly income as the dependent variable. The second column reports OLS regression results with the same dependent variable for the sub-population of survey respondents with a history of incarceration. The third column reports FE regression results with weekly income as the dependent variable for the same subset of respondents. Controls for ability, race, gender, age and education are included in the OLS regressions, and controls for history of incarceration, age, and whether an individual was enrolled in school at the time of data collection are used in the FE regression.

[TABLE 2 ABOUT HERE]

We find suggestive evidence in favor of hypothesis one for the full sample. Column 1 indicates a \$78.18 ($p < 0.01$) increase in weekly earnings associated with training in the previous period for the full sample of the NLSY. However, the coefficient on the interaction term between history of incarceration and training of $-\$58.63$ ($p < 0.05$) suggests that individuals with a criminal background who engage in training experience a much smaller increase in weekly earnings of just \$19.55.

Columns 2 and 3 present the OLS and FE regressions in which only previously incarcerated individuals are included. Though the OLS regression indicates a \$29.21 ($p = 0.24$)

increase in weekly income associated with training in the previous year for individuals with a history of incarceration, the point estimate does not reach statistical significance. Further, each element of the Mincerian earnings function (age and education) has a statistically significant and positive impact on earnings for those with a history of incarceration. This, and the fact that the impact of being high ability on weekly earnings is positive and statistically significant ($b = \$10.19, p < 0.01$) suggest that those with a history of incarceration are financially rewarded for their skills and human capital. The lack of statistical significance of employment training after incarceration on economic outcomes indicates that employers do not consider this training a means of human capital improvement or a signal of underlying ability.

The results from the FE regression (column 3) indicate a reduction in earnings of \$7.87 ($p = 0.71$) in weekly income associated with training in the previous year for respondents who have previously experienced incarceration. As the standard error (21.51) is nearly 3 times the value of the point estimate, this suggests there is no clear relationship between training and income for those with a history of incarceration. It is important to note that the point estimates for those with a history of incarceration are significantly lower than the population level point estimate of \$78.18, meaning if the impact of training on income is positive for incarcerated individuals, it is almost certainly less impactful than training for those with no incarceration history.

In sum, there is minimal evidence in favor of hypothesis one for those with a history of incarceration. In fact, it is notable that in the FE regressions, point estimates for the effects of training on income per week are negative (though the estimates are sufficiently noisy). This result, which is consistent with neither human capital nor signaling theory, intimates that the application of economic theories to criminal justice populations is, at the very least, imprecise.

Hypothesis 2

The second hypothesis, that low ability individuals with a history of incarceration complete less employment training than high ability individuals, has already gained some support from the summary statistics reported in Table 1. We more rigorously test this hypothesis using a probit regression of ability on training completion. The results are displayed in Table 3.

[TABLE 3 ABOUT HERE]

Based on the regression with the full sample, the probability of completing employment is approximately 3% ($p < 0.01$) higher for high ability individuals than for low ability individuals. Further, as just under 10% of the total sample engage in training, a 3% increase in training probability constitutes a large increase relative to the population level average. There is also evidence in favor of the second hypothesis when the sample is restricted to individuals with a criminal history. High ability previously incarcerated individuals are 2% ($p < 0.05$) more likely to complete training relative to low ability previously incarcerated individuals. This finding illustrates that employment training meets at least one condition of a signal—namely, that it is utilized less often by low-ability individuals. We now turn to the third hypothesis to discern whether ability moderates the relationship between training and employment outcomes outlined above.

Hypothesis 3

Recall, if improved human capital is the primary mechanism through which training impacts employment outcomes, we would expect high ability individuals who engage in training to receive a larger increase in their weekly earnings than low ability individuals who engage in training. If signaling is the primary mechanism, then the benefits to training will be the same across low and high ability individuals.

[TABLE 4 ABOUT HERE]

Table 4 presents the results of four FE regressions with income per week as the dependent variable. The first two regressions directly test our third hypothesis, investigating whether human capital or signaling theory finds support in the population of previously incarcerated individuals. The third and fourth regressions are run on the subset of individuals with no history of incarceration to establish whether signaling or signaling theory finds support in the general population. Individuals are split into two groups; low ability (columns 1 and 3) and high ability (column 2 and 4). A comparison of the regression coefficient on training in regressions 1 and 2 will illustrate whether low or high ability individuals with a history of incarceration receive a greater benefit from training.

We find sufficient evidence to reject the human capital channel of employment training for those with a history of incarceration and find evidence inconsistent with signaling theory for the previously incarcerated. Beginning with the FE regression results in column 1, low ability previously incarcerated individuals receive an increase in weekly income of \$30.48 ($p = 0.28$) following training in the previous period. For high ability respondents (column 2), the regression coefficient on lagged training indicates that high ability individuals see a *reduction in earnings* of \$62.88 per week ($p = 0.11$) following training in the previous period.

These results further complicate the story of the effect of training on high and low ability individuals. If training leads to genuine improvements in human capital, then high ability trainees would see a larger increase to their earnings than low ability trainees whereas signaling theory posits the earnings effect would be equal across low and high ability individuals. However, neither theory is consistent with reduced earnings following training for any individuals, particularly those with high ability.

To ensure these results are not a function of a poorly specified regression or errors in our coding of variables of interest, columns three and four report FE regression results for low ability (column 3) and high ability (column 4) individuals with no history of incarceration. For low ability individuals, training in the previous period leads an increase in weekly income of \$6.14 ($p=0.91$). For high ability individuals, lagged training leads to an increase in weekly income of \$53.86 ($p=.00$). Thus, for the subset of the population with no history of incarceration, there is strong evidence in favor of human capital theory in this subset of the data, with high ability individuals receiving a boost to weekly income over \$45 more than that received by low ability individuals. Thus, our counterintuitive finding for the population with a criminal history is even more stark, as training clearly helps high ability individuals more than low ability individuals in the population writ large. We conclude that impact of training on income for the previously incarcerated is inconsistent with human capital, inconstant with signaling theory and is dramatically different than the impact of training on income for the general population.

Discussion and Conclusion

There has been a longstanding discourse regarding the value and efficacy of employment training for justice-involved groups. The findings of this work provide suggestive evidence that training improves the economic outcomes (income and employment probability) for the full sample of individuals in the NLSY. However, this is not the case for individuals with a criminal history. Further, training may actually harm high ability individuals in that subset. Notably, for high ability individuals with a history of incarceration, training leads to a *reduction* in earnings relative to an individual with a criminal background and no training, even though the individuals who are more likely to complete training are high ability.

What is driving these counterintuitive results for previous justice-involved individuals? Although the regression results above do not conclusively answer this question, the results combined with insights from the literature may speak to a possible explanation. It may be the case that training programs are not oriented towards improving outcomes for high ability individuals with a history of incarceration, as all individuals entering these programs are assumed to be low skill. Lichtenberger (2006) utilizes matched employer-employee data for over 80,000 justice-involved individuals in Virginia to investigate this very question. He finds the vast majority of those with a criminal history work in low-skill jobs and although high-skill jobs in the area of professional, scientific, and technical services constitute 14% of total employment in Virginia, just 2.5% of employers in these industries were willing to hire previously incarcerated individuals in his five-year sample window. The assertion that previously incarcerated workers must be low ability is also common in the academic literature studying the employment prospects of this very population.

A recent policy memo for the Hamilton Project titled “Increasing Employment for Individuals with Criminal Records” has three chapters, the longest of which is dedicated to understanding challenges in the low-skilled labor market (Doleac 2016). In fact, there is no mention of high ability workers throughout the article. Similarly, in “The Employment Prospects of Ex-Offenders,” Raphael (2007) explores differential employment outcomes for individuals before and after stints of incarceration. When discussing ways to improve employment outcomes, Raphael directs readers to paper focused on boosting earnings in the low-skill labor market.

If high ability workers with a criminal history are viewed as low skill by those designing training and potential employers in the same way they are perceived by many social scientists,

training might explicitly prepare justice-involved individuals for low ability jobs which are a poor match for their latent earnings potential. If this is the case, then training would not provide high ability workers with skills that would improve their performance relative to an untrained high ability individual with a history of incarceration. Although a conclusive pathway cannot be established in this paper, confirming and explaining the negative impact of training on income for high ability justice-involved individuals is fruitful ground for future research.

These results suggest that training is not unilaterally beneficial and is less beneficial to individuals with a history of incarceration than the general population. To improve the signaling capacity of these programs, increased investment in programs that encourage apprenticeships, internships, or other versions of on-the-job trainings that allow employers to observe the contributions of justice-involved employees before offering permanent employment may be beneficial. Based on the findings of this research, programs that provide temporary employment to build worker resumes may be less effective because they do not allow potential employers the opportunity to witness the employee's aptitude firsthand. This recommendation is consistent with the evaluations of the CRAFT, TJRD, and CEO programs—all of which followed a temporary employment model and were ineffective at improving outcomes for justice-involved individuals.

In interpreting the results of this research, there are several limitations to consider. First, data from the NLSY are self-reported. Thus, individuals may systematically omit information regarding their criminal history or unemployment as a result of desirability bias, or may simply misremember information over the course of the year. Further, non-respondents were disproportionately members of disadvantaged or at-risk groups, which is especially problematic given the nature of the research question. This systematic bias could potentially interfere with the validity of the data used in this analysis. Finally, our binary measure of incarceration

oversimplifies the complicated relationship many previously incarcerated individuals have with the justice system and treats those with multiple stints of incarceration the same as those with just one. As there are already so few high-ability previously incarcerated individuals in our dataset, a binary variable representing incarceration provides the most power for our regressions. Regressions with a more granular measure of ability using the top quartile coded as high ability were insufficiently powerful to generate any significant results, as just over 100 previously incarcerated individuals fell into this category. We acknowledge this as a limitation and leave the ability specific interaction of incarceration, training, and recidivism to future work.

In addition to data concerns, this work investigated the role of employment training generally. It may be that individuals that participate in particular types of training (e.g. vocational training) have a skill mismatch relative to the types of jobs they eventually pursue. If this is the case, human capital accumulation would not be expected to improve employment outcomes. Additionally, there is literature that suggests justice-involved individuals often find work through social networks or return to past employers post-incarceration (Berg and Huebner 2011; Brunton-Smith and McCarthy 2017; Cherney and Fitzgerald 2016). The current research did not control for these variables, meaning there was potential omitted variable bias in the model used. Future research should consider the role of vocational training type, social networks, and relationships with previous employers when examining the effects of employment training. This is expected, as many other variables are related to whether individuals choose to participate in employment training. Given the limited scope of the data, this work does not control for these factors, which may impact the results through omitted variable bias. Future research should consider additional controls related to factors that may influence employment training completion, income per week, and employment outcomes generally.

Finally, work by Ricciardelli and Mooney (2018) and Lindsay (2022) question whether justice-involved individuals can overcome the negative signal associated with their history of incarceration. It may be difficult for individuals in this group to find stable employment given the additional hurdles they face in the labor market due to the stigma associated with carceral history. Our work adds another element to this discussion, detailing the difficulty that previously incarcerated individuals have in the labor market even when they explore a pathway (e.g. training) that leads to economic success for those with no carceral background.

In light of these limitations, it is our hope that this work contributes to the development of successful training paradigms for individuals with a history of incarceration. By increasing the signaling potential of these programs, we expect employers to more accurately assess individuals through merit and indicators of ability rather than their interactions with the justice system.

Footnotes

1. Though an argument can be made for using AFQT scores as a metric variable rather than a dichotomous variable, there are benefits to the chosen method as it (1) more clearly tests signaling theory as proposed, (2) allows for a straightforward interpretation of the interaction term, and (3) provides sufficient power for our statistical tests, whereas more granular measures of ability would not due to the low level of previously incarcerated individuals above the median ability level (see Table 1).

Table 1. Summary statistics for variables of interest

	N	Proportion Receiving Any Training	Proportion of Year Employed	Weekly Income When Employed
History of Incarceration	1,846	9.81%	71.68%	\$337.73
High Ability	439	10.02%	75.21%	\$415.69
Low Ability	1,407	9.73%	70.58%	\$313.41
No History of Incarceration	47,144	13.12%	80.78%	\$388.54
High Ability	22,595	14.26%	81.84%	\$415.88
Low Ability	24,549	12.08%	79.79%	\$363.37

Table 2. OLS and FE specifications of pre-employment training completion on income per week, NLSY97 2000-2010

	Full Sample	Previously Incarcerated	
	OLS	OLS	FE
Training, t-1	78.18*** (4.06)	29.21 (24.72)	-7.87 (21.51)
AFQT (1=high)	10.19*** (2.89)	50.56*** (18.04)	
Previously Incarcerated *Training	-58.63** (25.69)		
Black	-26.81*** (2.74)	-57.75*** (15.06)	
Female	-85.62*** (2.60)	-123.56*** (18.81)	
Age	52.89*** (0.54)	17.54*** (3.10)	36.34*** (3.47)
Currently enrolled	-15.97 (3.22)	-46.90 (23.31)	-21.04 (21.74)
Education	5.89** (1.50)	44.82*** (8.33)	
Previously Incarcerated	-111.84*** (8.07)		
Currently in School	-15.97*** (3.22)	-46.91** (0.04)	-21.04 (21.75)
Constant	-857.11*** 11.66	-217.41*** (71.72)	-574.66 (87.20)
Observations	36,552	1,101	1,846
R-squared (overall)	0.29	0.13	0.16

Note: Robust standard errors in parentheses ** $p < 0.01$, * $p < 0.05$, † $p < 0.10$ (two tailed tests)

Table 3. Probit regression of AFQT on training completion, 2000-2010

Variables	Full Sample Probit	Incarceration History Probit
AFQT (1=high)	0.03*** (0.004)	0.02* (0.01)
Incarceration history	-0.02* (0.01)	
Observations	36,552	1,846
R-squared (overall)	0.02	0.01

Note: Robust standard errors in parentheses

** $p < 0.01$, * $p < 0.05$, † $p < 0.10$ (two tailed tests)

Table 4. F.E. specifications: pre-employment training completion on income per week, 2000-2010

Variables	History of Incarceration		No History of Incarceration	
	Low Ability	High Ability	Low Ability	High Ability
Total training, t-1	30.48 (27.90)	-62.88 (39.24)	6.14 (6.75)	53.86*** (6.95)
Age	32.27*** (4.23)	45.16*** (8.02)	44.76*** (1.08)	74.21*** (1.28)
Currently in School	-35.79 (35.29)	-22.63 (38.99)	-45.59*** (5.99)	33.02*** (6.44)
Constant	-492.36*** (106.64)	-717.17*** (202.58)	-702.21*** (26.08)	-1350.14*** (31.02)
Observations	973	439	16,522	22,595
R-squared (overall)	0.14	0.22	0.32	0.44

Note: Robust standard errors in parentheses. ** $p < 0.01$, * $p < 0.05$, † $p < 0.10$ (two tailed tests)

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