

Are Schools in Prison Worth It? The Effects of and Economic Returns to Prison Education

Steven Sprick Schuster & Ben Stickle

Abstract

We estimate the effects of various forms of prison education on recidivism, post-release employment, and post-release wages. Using a sample of 148 estimates drawn from 78 papers, we conduct a meta-analysis to estimate the effect of four forms of prison education (adult basic education, secondary, vocational, and college). We find that prison education leads to decreases in recidivism and increases in post-release employment and wages. The largest effects are experienced by prisoners who participated in vocational or college education programs. We also calculate the economic returns on educational investment for both prisons and prisoners. We find that each form of education yields large, positive returns, due primarily to the high costs of incarceration, and therefore high benefits to crime avoidance. The returns vary across education types, with vocational education featuring the highest return to each dollar spent (\$3.10) and college seeing the highest positive impact for each student participating (\$16,863).

Introduction

Following an explosive growth in U.S. incarceration rates starting in the 1980s, more than six in every 1,000 people in the U.S. population are behind bars, the highest rate in the world,¹ despite many other countries having higher violent crime rates. A 2003 estimate by the Prison Policy Initiative projected that six percent of Americans will be imprisoned at some point in their lifetime, including almost one-third of all African-Americans. The decision to incarcerate relatively more people comes with costs, both direct and indirect. The direct costs consist of the large financial commitments made to house prisoners. While different groups disagree on the total cost (the Bureau of Justice Statistics estimates \$81 billion, while the Prison Policy Initiative places that number at \$182²) there is broad agreement that the costs of maintaining prisons are large.

¹https://www.prisonstudies.org/highest-to-lowest/prison_population_rate?field_region_taxonomy_tid=All

²<https://www.prisonpolicy.org/reports/money.html>

The indirect costs are potentially even larger. Incarceration decreases rates of employment (Apel and Sweeten 2010) and education for both the incarcerated (Hjalmarsson 2008) and their dependents (Shlafer, Reedy and Davis 2017). Because lower levels of education have in turn been found to have a causal effect on arrest and incarceration (Lochner and Moretti 2004), the decision to incarcerate a parent increases the likelihood that the child also ends up in prison. Levels of social engagement (Chattoraj 1985) and civic participation (Lee, Porter and Comfort 2004) are negatively affected by incarceration. Just as the direct costs of incarceration increased with the prison population, these indirect costs did as well.

These costs are avoidable, or can at least be attenuated, through effective policies and programs implemented within jails and prisons themselves. If programs in prisons can provide inmates skills and tools that improves their post-release outcomes, they can reduce the indirect costs of incarceration itself. Effective programs can reduce the future costs of incarceration (through reduced recidivism) as well as reducing the indirect costs caused by imprisonment in the first place.

For decades, the notion that incarcerated people could see their paths changed was a minority opinion. The collapse, by the mid-1970s, of the goal of rehabilitation gave way to the “nothing works” mindset (Martinson 1974), which led to bi-partisan support for increasingly punitive prison sentences and a reduction in rehabilitation programs. After all, if nothing worked in rehabilitating criminals, why waste money on education and training, instead of just throwing away the key? As a result, the 80s and 90s were defined by escalations in punishments, such as the Sentencing Reform Act of 1984, the Anti-Drug Abuse Act of 1986, and the expansion of three-strikes laws in the 1990s.

Recent years have seen a change in both policy and public opinion. Reforms aimed at the criminal justice system include the First Step Act, which eased mandatory minimum sentence rules for judges, and the re-authorization of the Juvenile Justice and Delinquency Prevention Act (both in 2018). Nonetheless, rates of incarceration remain high; the Sentencing Project has described the 40-year trend of incarceration as a “Massive Buildup and Modest Decline”. The rate of incarceration, down slightly from its early 2000s peak, is still 4 times what it was in 1970. The share of

Americans who feel that the criminal justice system is not tough enough has dropped by 50% since 1992, while the share who believe that the system is too tough has increased 10-fold.³ Similarly, several recent national polls (ACLU’s Campaign for Smart Justice, Justice Action Network) show that a large majority of Americans believe rehabilitation should play a larger role in American criminal justice.

One place where this reform is playing out is in prison classrooms. One of the victims of the 90s “tough on crime” bills was educational offerings to prisoners, especially college programs. The 1994 Crime Bill eliminated the eligibility of Pell grants for prisoners, and the rate of college participation in prison dropped from 19% in 1991 to 10% in 2004.⁴ While the number of college offerings has increased in the past decade,⁵ educational opportunities beyond high school are still below their pre-1980s levels. Even programs that are offered spend a fraction of what is invested in students outside of prison. For example, the state of Texas spends about \$12,000 annually per student in the state’s public school system, but only about \$1,000 per incarcerated student.

The optimal policy regarding education and job-training for the incarcerated population hinges on the effectiveness of the programs themselves. If programs are minimally effective at achieving the main goals of rehabilitation (reduction in recidivism, higher wages or rates of employment), then education programs are likely not worth the expense. However, if the returns on investment for prison education are large, expanding prison programs would likely be an effective public policy.

The importance of identifying best practices in prison education and job-training is heightened by the recent lifting of the federal ban on Pell grants for prisoners. The 1994 ban drove many colleges and universities away from prison education, and the re-introduction of federal subsidies for incarcerated students will likely increase the number of programs being offered. To maximize the return for public dollars, it is important that we identify the types of programs that appear to work best, and the populations for which they are most effective.

³<https://news.gallup.com/poll/324164/fewer-americans-call-tougher-criminal-justice-system.aspx>

⁴<https://www.prisonpolicy.org/blog/2019/08/22/college-in-prison/>

⁵<https://www.vera.org/news/how-state-higher-ed-leaders-are-expanding-college-in-prison>

Goals & Research Question

This study focuses on the efficacy of prisoner education, including adult basic education (ABE), secondary education, higher education, and job-training. What effect, on average, do these programs provide in terms of improving outcomes for prisoners, and, by extension, the public? This is a crucial step in determining the economic and social returns on investment in prison education.

This study is a meta-analysis on a large set of papers that have estimated the effect of prison education. Given the decentralized nature of prison education systems, numerous studies have estimated the impact of a variety of different programs, often finding different results. By pooling these effects together, we are able to obtain a more precise estimate of causal effect. For this analysis, we included papers that measured one of the following outcomes: recidivism, post-release employment, or post-release wages. By including several relevant outcome variables in a single meta-analysis, we can estimate the return on investment (ROI) for prison education.

Prison education and training has received extensive attention, and this work builds on numerous meta-analyses that have estimated the causal effect (Wilson, Gallagher and Mackenzie 2000; Chappell 2003; Aos, Miller and Drake 2006; MacKenzie 2006; Davis et al. 2013; Ellison et al. 2017; Bozick et al. 2018). Bozick et al. (2018) set the benchmark for meta-analyses by providing results that are based on a large number of papers, allowing them to compare effects of different types of education. Looking at a sample of 57 studies on recidivism and 21 on employment, they found that education has a significant effect on recidivism, with a 32% reduction in the odds ratio of recidivism associated with receiving education while incarcerated. While they also found that education increased post-release employment, the estimates were significantly smaller, with education leading to a 12% increase in the odds ratio of employment. However, the authors also found evidence of publication bias throughout their sample, suggesting that papers that found significant effects were more likely to be published, potentially resulting in biased meta-analysis results.

Prison education present numerous problems for a meta-analysis. The large number of different

types of programs means that many more papers are needed to try to separately determine the effects of different types of education systems. Given the relatively small number of papers analyzed in previous studies, disaggregating the sample into smaller subsets has been difficult.

Similarly, the need for continued meta-analyses is evidence by the relative dearth of high-quality papers identified in previous studies. Given the observational nature of most studies of prison education, the differences in outcomes between those who receive education and those who do not is plagued by the unobserved effects of whatever drove students to get education in the first place. Meta-analyses in the field of medical research can solve this by focusing on randomized control trials, which addresses any selection bias. In social science research, such trials are rare. Instead, we are reliant on quasi-experimental methods, where researchers engaged in observational research compare the treatment group to a control group that is otherwise similar, despite the differences in educational choices.

This lack of studies that provide plausibly unbiased estimates of causal effect make it difficult to compare the effects of different kinds of education within a meta-analysis, because it requires research to break the sample into smaller groupings of papers. But such sub-group analysis is crucial, as not all forms of prison education are likely to be equally effective. By building the largest sample of papers of any meta-analysis, we are better able to analyze subsets of the papers, a crucial step given the variation in how educational programs are implemented.

The challenges posed by the small number of quasi-experimental studies can be seen in the meta-analysis of Bozick et al. (2018). When they compared the relative effectiveness of different forms of prison education, the small number of papers available to them meant they needed to use all papers in their sample to estimate the relative effects. But because many papers in the sample are likely to be plagued by selection bias, the resulting aggregate measures will be too.

The authors run into similar issues in their study of the effect of education on employment. Over the 21 studies they analyze, they find that education increases the odds ratio of post-release em-

ployment by 12%. However, when they restrict their sample to only Level 4 or higher papers (of which none are Level 5), their estimate of the positive impact of education actually increases, but their standard errors are so large that the estimates are no longer statistically significant. This lack of precision is the result of only 3 of the 21 studies qualifying as a Level 4. It would therefore be incorrect to conclude from these results that education has no effect on employment; the authors cannot eliminate the possibility that education has a very large effect on employment (a change in the odds ratio of 0.66 is within the 95% confidence interval). Instead, these results speak to the pressing need of continued research.

Against this background, the body of literature eligible for use in a meta-analysis can grow quickly. A small number of new papers could double or triple the sample size. This is all the more true because of both the increased interest in prison reform and advancements in econometric techniques, meaning that more recent research is more likely to provide a quasi-experimental estimate of causal effect, and therefore can significantly improve the findings of meta-analyses.

Sample and Outcomes

Our sample includes papers published (or posted online) between 1980 and 2022 that studied the impact of prison educational programs in United States prisons. We constructed our sample by first compiling a large list of potentially relevant papers using online databases, repositories, and the bibliographies of existing research, including previous meta-analyses. We only included those that conducted primary research on the effect of education and training programs (instead of the effect of having already obtained such training before entering prison). More details on the method used to find papers is provided in the Appendix.

The outcomes of interest for this analysis are: recidivism, which is typically defined in the papers included here to be a return to prison; employment; and wages. While these are not the only relevant outcomes, they are the ones that are most likely to be measured by researchers and are the ones with the clearest economics benefit. One of the primary goals of this paper is to estimate the return on investment for prison education, leading us to prioritize economically-quantifiable

outcomes.

From our initial search of papers, we identified 750 papers for potential inclusion in the study. Of these, most were eliminated for not presenting the results of an original study, or for falling outside the scope of the out analysis, such as studies estimating the effect of pre-incarceration education. In total, we identified 78 papers that estimated the effect of education on one or more of our outcomes. From these papers we obtained 148 separate estimates of the causal effect of prison education.

Most of the papers that are novel to our sample are those that have been published in the past 5 years and therefore after the most recent large-scale meta-analysis. However, we did identify several studies that were overlooked by previous analyses. Most notable are the studies conducted directly by various states' Departments of Corrections, which were more likely to be overlooked in previous studies.

Measures of Study Quality

Determining the quality of the studies used in the meta-analysis is critical, as empirical results can be affected by which studies are selected and the weights attached to each set of results. The Maryland Scientific Methods Scale (Farrington et al. 2002) has become a commonly used method of measuring study quality in the criminology field, as its grading system is catered specifically to the measure of program effect on criminal activity.

The Maryland Scientific Methods Scale (SMS) provides a framework for grading studies from the lowest level of rigour (level 1), to the highest (level 5). Level 1 includes studies that measure “Correlation between a crime prevention program and a measure of crime or crime risk factors at a single point in time.” Given the lack of a comparison group, measuring differences in outcomes is not possible, and these studies are not included in our sample.

Level 2 studies “Temporal sequence between the program and the crime or risk outcome clearly

observed, or the presence of a comparison group without demonstrated comparability to the treatment group.” Typically, these studies will provide measures of the difference in the average outcomes between two groups (such as those who participated in education and those who did not). We include all studies that earned a 2 or higher in our initial sample of papers but exclude studies scoring a 2 from our main estimates of causal effect.

Levels 3-5 are the considered to have satisfied a “minimum interpretable design” (Cook and Campbell 1979). Typically, this will be achieved with a quasi-random assignment (Levels 3-4) or random assignment (Level 5). Level 3 studies provide “A comparison between two or more comparable units of analysis, one with and one without the program.” Level 4 studies provide “Comparison between multiple units with and without the program, controlling for other factors, or using comparison units that evidence only minor differences.”

In practice, the distinction between levels 3 and 4 can be unclear. Different papers provide different definitions of what kinds of papers qualify at Levels 3 and 4 (Bozick et al. 2018), and the scoring guide provided by whatworks.org (which we follow) places two quasi-experimental methods (instrumental variables (IV) and regression discontinuity) at Level 4 while another (difference-in-differences(DID)) is level 3. There is no ex-ante reason to prefer IV regressions to DID ones, as both come with sets of identifying assumptions that, if satisfied, should provide unbiased estimates of causal effect, just as random assignment should.

Level 5 studies are those that use random assignment. Such a study, properly conducted, will yield an un-biased estimate of causal effect, because it will remove from the sample any unobserved, systematic differences between the treatment and control groups. However, even with random assignment, studies will only qualify for a level 5 grade if they address attrition concerns (people who are randomly assigned treatment may drop off) and any potential for contamination. Studies that fail to address these concerns may be dropped to grades of Level 3 or 4.

Each study in our analysis was graded by at least two research assistants.⁶ If the two gave a

⁶Several studies, and the scoring guide, reference grades for both method and implementation. For example, a paper that utilizes

study the same grade, that grade was assigned to it. If the two grades differed, one of the authors evaluated the paper and assigned a grade. Finally, each research assistant had the option to flag each study, regardless of grade, if they suspected that the study had an error or irregularity that could affect its finding of causal effect.

Our analysis includes an unprecedentedly large number of studies, especially high-quality studies. Table 1 shows the breakdown of papers by outcome and SMS score. The sample used to estimate the effect on recidivism includes 69 papers covering 100 separate estimates of causal effect, while our sample for employment consists of 30 papers with 36 separate estimates. Of the 100 estimates of the effect of education on recidivism, 24 are graded as a 4 or 5 on the SMS scale. 10 of the 36 estimates for the effect on employment are graded as a 4 or 5. 40 papers with 62 separate estimates earn scores of 3 or more for our recidivism outcome, while 19 papers with 22 estimates achieve this in our employment sample. This large sample is critical to our analysis, as it allows us to compare the effects of different types of educational programs using only papers that scored high on the SMS score.

Our sample of papers estimating the effect of education on wages is smaller, with 9 papers providing 12 separate estimates of causal effect. Despite the small number of papers estimating the effect on wages, they earn higher SMS scores. This is due to the fact that papers that report standard errors are both likely to earn higher SMS scores (as they are more likely to use higher-quality econometric methods) and more likely to be included in the wage sample.

Appendix Table A.1 shows the entire sample of papers that are included in the meta-analysis, along with the treatments used, outcomes measured, and SMS scores earned. The total number of studies included in the meta-analysis exceeds the number of papers included, as papers that study more than one outcome (such as recidivism and employment) will be used separately. Similarly, several papers evaluate the effects of numerous forms of education (such as vocational and GED).

random assignment would achieve a 5 for method, though it could receive a 3 or 4 for implementation if it fails to address one or more concerns. We use an implementation score to assign grades.

Econometric Approach

We use random effects analysis, also called the DerSimonian and Laird method (DerSimonian and Laird 1986), to estimate the effect of prison education. The primary alternative estimation strategy is fixed effects, which imposes an implicit assumption that the “true” causal effect of intervention is common across studies. This assumption is almost certainly violated in the setting studied here, as different estimates reflect estimates of causal effect on interventions from programs with different method of implementation (such as the method or content of instruction and training) or populations (male or female, high- or low-security prisons). In fact, as shown later, we exploit this exact variation in implementation to get a better picture of what kinds of programs work well.

Whenever possible, we used estimates of the impact of participation in an educational program, instead of program completion. This has two benefits. First, the endogeneity of the decision to finish a program is likely to be strong; students who are driven enough to finish a program are likely to be different from dropouts, so comparing these two groups will exacerbate omitted variable bias. Program participation is more likely to be affected by things outside of a prisoners’ control, such as their eligibility (based on location, reading level, etc.) and therefore less likely to be plagued by estimation bias. Second, from a policy perspective, participation is more relevant than completion, especially since program completers are already included in the population of program participants. When we evaluate the overall costs and benefits of a program, we are inherently doing so against a counterfactual of no program at all. People who participate in the program and drop out may receive benefits anyway, and providing the education certainly costs money, so the most effective evaluation is to measure program participants (completers and non-completers) against non-participants.

In cases where the outcome variable is binary, we convert the outcome variable into an odds ratio, thereby normalizing the outcome and harmonizing it across different studies.⁷ It’s important to note that when we are considering odds ratios, they are not the same as absolute probabilities. For

⁷We use the log odds ratio for our statistical analysis, and then convert these results to odds ratios, which have an intuitive interpretation.

example, if the odds ratio of recidivism for is 0.8 for those who receive education, and 1 for those without it, this does *not* mean that education will lead to a 20% drop in recidivism. It means that the odds ratio (defined as a probability of returning to prison divided by the probability of not returning) decreases by 20%.

When the outcome is binary, we can include studies in our analysis that presented differences in means, even if they do not report a standard error for their estimates, even though standard errors are typically necessary for inclusion in a meta-analysis. One characteristic of binary data is that the standard deviation of a distribution can be determined using only its mean. Therefore, in cases where a study presents differences in means but no standard errors, we back out the standard errors ourselves.⁸ For our sample of studies estimating the effect of education on wages, we could only use papers that reported the standard errors or standard deviations, as we cannot back out these numbers using a simple difference in means.

Various decisions had to be made by the researcher. In cases where multiple recidivism times were measured (1 year, 2 years, etc.) the we used 3 years, as this is by far the most common outcome measured in the literature. Papers were not uniform in their definition of recidivism. Some papers defined recidivism by re-arrest, others by parole violations, and others by returns to prison. When papers reported multiple outcomes for recidivism, we used return to prison as the outcome variable. This is the most common outcome used by most papers in our sample.

In several studies (Schumacker, Anderson and Anderson 1990; Adams et al. 1994) the authors reported the effects of participating in multiple forms of education (such as academic + vocational). Previous meta-analyses (Davis et al. 2013; Bozick et al. 2018) included these estimates alongside the estimates of effects for being in either academic or vocational programs. However, since this measures the effects of two doses of treatment instead of one, we chose to instead incorporate these groups into a single regression, include dummy variables for both forms of education. This allows us to disentangle the separate effects.

⁸We recreate the data and run a logit regression. Whenever papers included cross-tabulated tables, we included any possible variables. For example, Clark (1991) included recidivism data for each year. We included year dummy variables in the recreated data and as covariates in the logit regression.

In cases where authors report more than one specification of an empirical model (for example, panel data methods have several models with similar identifying assumptions) the model that was preferred by the original paper’s authors was selected. If no preference was expressed, the model with the best fit was used.

When papers did not report standard errors and we could not calculate the standard errors ourselves, the paper was not included. However, if the statistical significance was reported (such as the 1 or 5-percent significance level), standard errors corresponding to that exact level of significance was selected. For example, if a study failed to report exact standard errors, but reported that the estimates were significant at the 5-percent level, we imputed standard errors that equated to exactly 5-percent significance. This is a conservative method, since we will be underestimating the statistical significance of any findings. Within the meta-analysis, this is important, since papers are weighted based partially on the precision of their estimates. By imputing standard errors that were no smaller than the true standard errors, we avoided giving a study higher weight than is appropriate while also being able to use its findings.

Findings

Recidivism

Figure 1 provides a forest plot showing the results for the effect of education on recidivism for all papers in our sample, regardless of their quality score. The forest plot shows each study’s estimate and standard errors. The forest plots show the results calculated using the log odds ratio, which has no easy interpretation. Therefore, Table 2 presents the results converted into an odds ratio. The odds ratio for recidivism is the probability that someone returns to prison divided by the probability that they do not. Using a 2021 Bureau of Justice Statistics estimate of 46% for the 5-year recidivism rate, the baseline odds ratio for recidivism is $\frac{0.46}{1-0.46} = 0.852$.

As seen in the 3rd row of Panel A in Table 2, the odds ratio for the treatment group is 0.757.

This means that receiving prison education leads to a 24.3% decrease in the odds of recidivism. To convert this into a probability, we simply multiply this by the baseline odds of recidivism, $0.852 * 0.757 = 0.645$. An odds ratio of 0.645 corresponds to a probability of 39.2%. This means that education decreases the probability of recidivism by 6.8 percentage points, or 14.8% against a baseline of 24.3%. These results suggest that participation in a prison education program significantly decreases the likelihood of returning to prison.

This figure is an overstatement of actual causal effect, as it includes many papers that do not estimate effects using experimental or quasi-experimental methods. Next, we estimate the effect using only papers obtaining a 3, 4 or 5 on the Maryland scale. Restricting the sample in this way is crucial for two reasons. First, these papers are more likely to avoid omitted variable bias and obtain unbiased estimates of causal effect. But there is an additional reason that is often overlooked in the literature. High-quality papers are more likely to have larger standard errors, because the exact things that make them less likely to provide biased estimates (inclusion of covariates, careful sample selection, robust or clustered standard errors) are the exact things that are likely to increase a study's standard errors.

Using the sub-sample of high-quality papers, we find that participation in a program decreases the odds ratio of recidivism by 19.1%, which is smaller, but still statistically and economically significant. If we further restrict our sample to only studies receiving a 4 or 5, we estimate education to decrease recidivism by 17.2%. This drift towards zero as we exclude papers that are unlikely to provide unbiased estimates suggests that the true causal effect is more likely to 17-19 percent than 24-25 percent.

We also find a drift in estimates of causal effect over time. While we find a 24.3% reduction in the odds recidivism over our entire sample, we find this number drops to 12.5% when we only use studies published since 2010. This can be seen in Figure 1, which arranges papers chronologically. Newer papers find results that are smaller in magnitude and also feature less variance. Some of this effect is due to the fact that later papers are more likely to have stronger econometric strate-

gies, and therefore score higher on the SMS scale. As we have already seen, this leads to smaller estimates of causal effect.

But the change in the composition of papers cannot explain all of this trend. Using just our sub-sample of studies earning SMS scores of 3 or higher, we estimate the causal effect since 2010 to be a 11.2% reduction in recidivism, compared to 19.1% for the entire sample. This difference has important policy implications. While a 19.5% reduction in recidivism is a good retrospective estimate of the effects on people who have already been released, the 11.2% reduction better reflects the effects of the current educational systems in prisons.

We also find variation in effects across educational programs. The programs evaluated in the papers studied here fall into one of the following categories: ABE, Secondary Education/GED, Vocational Education/Training, Post-Secondary Education. Next, we estimate the effect of each kind of education program on our outcomes of interest. Given the large size of our sample, we are able to perform sub-group analysis while only relying on high-scoring papers (3, 4, or 5 SMS scores), providing support to the claim that we are able to measure true estimates of causal effect.

Pabel B of Table 2 shows the differential effects of education type on reducing recidivism. We observe significant variation in effect of education on recidivism. ABE and secondary education (high school, GED) appear to have similar effects, each leading to a 11-12 percent decrease in recidivism. Some of this similarity is due to the two groups being pooled in many estimates. The pool of papers for ABE and secondary education have 14 shared estimates, as numerous papers estimate the effect of “academic” programs, which could be either ABE or secondary programs.

Vocational education is somewhat more effective and ABE or secondary education, leading to a 16.1% decrease in the odds ratio for recidivism, but post-secondary education is where we observe the largest difference. College programs are especially effective tools for decreasing recidivism. We find that participation in a college program decreases the odds of recidivism by 42.5%. This number is so much larger than the other forms of education that point estimates for each of the

other education categories falls outside the 95% confidence interval for college education. This means we can reject the null hypothesis that any other form of education is as effective as college education in reducing recidivism.

Unsurprisingly, college programs are also by far the most costly form of intervention studied here. While other forms of education cost between \$1,000 and \$2,000 per year per student, college programs cost around \$10,000. Bard College's program, which is studied in one of the papers in this sample, costs \$9,000 for each participant/year, while Pitzer college has a similar cost of \$10,000. College programs also take longer to complete, meaning that not only is each participant/year more costly than other programs, each student is in them for more years, further increasing the gap in the cost.

Employment

Figure 2 shows the forest plot for employment. Using our entire sample of papers, we find that education increases the odds ratio of employment by about 13.4%, which is a finding in line with previous studies. Given baseline estimates of the percent of released prisoners who are employed, this equates to an increase of about 3.08 percentage points. Unlike our recidivism findings, the estimated effects of education on employment do not depend strongly on the SMS scores of the papers used to build our sample, as seen in Table 3. While we observe a decrease in our estimates when we use papers scoring 3, 4 or 5 on the Maryland scale, when we further restrict our sample to papers scoring only 4 or 5, we obtain an estimate of a 12.2% increase in the odds ratio for employment, which is similar to that of our overall sample.

Unlike our recidivism findings, we do not see a drift of causal effect in recent years. While we found the effect of education on recidivism to have dropped by more than half since 2010, our estimates of the effect of education on employment using papers published since 2010 (a 14.6% increase) is almost exactly the same as the estimates for the larger sample. Using our subset of papers with SMS scores of 3 or higher, the effect since 2010 (9.1%) is also similar to the 9.75% increase from the entire sample.

Panel B of Table 3 shows the effects of different types of education on employment. The pattern is similar to our recidivism findings. ABE and secondary education have the smallest effects. The effects are less than 3% and neither of them are statistically significant. This means that the decrease in recidivism observed earlier for each of these forms of education is not being driven by a significant uptick in observable employment. Vocational education has the clearest positive impact on employment, increasing the odds of employment by 10.5%. This further supports our recidivism findings that vocational education provides a larger boost to post-release outcomes than ABE or secondary education. We estimate that college programs increase the odds of employment by an even larger amount (20.7%). However the college estimate is derived from only a single study.

Earnings

Finally, we turn to estimates of the effect of education on earnings. Unfortunately, our sample is much smaller, due primarily to the dearth of reported standard errors in the studies included in our sample. Even if studies report estimates of causal effect, findings cannot be included in a meta-analysis without standard errors. When an outcome is binary, such as recidivism or education, we can calculate standard errors in single-variate settings by simply re-creating the data from the descriptive statistics. When the variable is continuous, such as earnings, no such replication is possible, meaning that some studies cannot be included in our estimates for earnings, even if they measure results.

Figure 3 shows the forest plot for our sample of 12 estimates using quarterly earnings. For each estimate, we normalized the numbers to quarterly earnings and inflated them to 2020 values. We find that education increases quarterly earnings by \$131. Given the small number of studies, this estimate is only significant at the 10% level. While this result may seem like a by-product of the finding that education increases employment, it is not. Most of the papers in the sample estimate the effect of wages only on those who are employed (meaning that they are dropping unemployment people from the sample). People induced into the workforce by any intervention (including education) are likely to be relatively low earners, meaning that it's possible to see

an increase in employment and a decrease in wages. The fact that we see a modest increase in wages means that the wage effects amplify the employment effect, instead of eating away at it. While we cannot reject the null hypothesis that education increases wages,⁹ we can reject a null hypothesis that the increased employment is associated with lower wages. Even a small reduction in wages (\$25) is outside the 95% confidence interval.

Robustness Checks

Because of the number of judgements involved in meta-analyses (choice of studies to include, grading, empirical framework), sensitivity analysis is especially important. We performed a series of robustness check to determine the degree to which any of these decisions affected our final findings. A major concern for meta-analyses is publication bias. It is possible for publication bias to lead to erroneous conclusions of significant effect, even in analyses exclusively using high-quality research. If studies that find no effect are less likely to be published, a meta-analysis could conclude a significant effect even if interventions have no true effect.

This is especially true in situations where the plausible effects are one-sided. Consider a hypothetical where prisoner education has no effect on measured outcomes. In this case, a high-quality study will be just as likely to find that an intervention leads to an increase in recidivism as it is to find that it causes a reduction. But a study that finds education increases recidivism or reduces employment is less likely to be published, since these findings would have little theoretical underpinning.

Therefore, we must test for the existence of such compositional biases in the population of studies that could threaten the credibility of our findings. The primary test for the existence of publication bias is a “funnel plot” and its corresponding tests (Egger et al. 1997). If publication bias affects the distribution of the empirical findings, we would expect to see an asymmetric distribution, since studies on one side of the distribution would be truncated. Previous meta-analysis (Bozick et al. 2018; Davis et al. 2013) have found evidence of publication bias. Does our larger set of papers,

⁹At the 5 percent level, the results are not significant, though they are at the 10% level.

including more working papers, address the issues associated with publication bias?

Figures 4-6 show the funnel plots for each of our sets of outcomes. The idea behind the funnel plot is that, if estimates are being drawn from the same probability distribution, they should be clustered around the mean. The more precise estimates are (i.e. smaller standard errors), the more closely they will be clustered. With larger standard errors, typically from small sample sizes, we expect to see the distribution to spread through the funnel. If publication bias exists, one side of the funnel is less likely to be filled out. This is why this is also called a test for “small sample” bias.

Since we are estimating effects that are heterogeneous (i.e. college is more effective than ABE) we would expect more spread at the top of the funnel (Sterne et al. 2011), which we do observe. However, if there is publication bias in this context, it would likely be due to studies that find a null effect failing to be published. Likewise, studies that find education to increase recidivism are unlikely to be published, since there is little theoretical motivation for supposing that education causes an increase in recidivism.

We test for the threat of publication bias directly using an Egger test (Egger et al. 1997). For the entire recidivism sample, we find evidence of publication bias. However, our sub-sample analysis exhibits very little evidence of publication bias. When we restrict our sample to only papers earning a 3 or above on the Maryland scale, we find no evidence of publication bias in our ABE, secondary or vocational education samples. We find some evidence of publication bias with our sample studying the effect of college education, so the relevant question is whether this bias is enough to explain the findings that college education is more effective. We test this by adding (non-existent) results to the sample that would lead the set to pass the Egger test. This means that we added a set of results featuring estimates with large standard errors but with small effects on recidivism (or even positive effects) until the sample was balanced. Once the set is balanced enough to pass the Egger test, we still find college education to be significantly more effective than other forms of education.

As seen in Figures 5 and 6, we find no evidence of publication bias in our sample of papers estimating the effect on employment or for wages, regardless of whether we look at our entire sample of estimates, or at any relevant sub-sample. This is one possible reason why our results are robust to looking at either recent years or papers scoring highly on the SMS scale without our estimates changing.

We also conducted a “leave-out” test, in which we re-run our results after excluding one of the papers. This addresses any concern that our results are being driven by any single paper that we decided to include in our sample. Our use of a DerSimonian-Laird estimator should address any out-sized effect from outlying studies, as it places lower weights on studies that obtain results far away from the median. Still, we can best show that no single set of results is driving our main findings of causal effect by running our analysis after dropping any single paper. The leave-out analysis is available upon request.

ROI Estimate

Given that prison education programs have a corresponding cost, a finding of positive effects is not sufficient to support claims justifying the existence such programs, nor their expansion. How do these benefits compare to the costs of implementing the programs in the first place? Using a variety of estimates of costs (which we draw from a variety of sources) and benefits (from the analysis presented here) we calculate the return on investment of education programs.

Obtaining an estimate of the cost to educate a prisoner is difficult. While many studies provide cost estimates, they almost always provide estimates of the cost of educating a student for one year, not the total cost of educating the average student. In their cost-benefit calculations, Davis et al. (2013) used estimates based on the average cost per student using a DOC annual education budget.¹⁰ But in order to determine the economic returns for educating a student, we also need to know how long a prisoner was taking classes. If a student participated in programs over two or more years, the annual average cost per student will underestimate the cost of education.

¹⁰The \$1,400 estimate used in that paper was obtained by calculating the cost per year from a three-state sample.

While there is little evidence about the duration of participation in education programs, data from the Texas' Windham School District (WSD) participant-year costs leads to an understatement of the cost of education for the average student. During its 2019-2020 fiscal year, the school district served 60,901 students. But of the total number of prisoners released that year who had participated in the WSD was 41,759. This suggests that the average student took courses for more than one year. If each student was taking classes for just one year, we would expect the number of people having participated in WSD programs who are currently leaving the corrections system to be about the same as the number of people taking classes in any given year. The numbers above suggests that many students are taking classes in multiple years. Therefore, when the cost per participant in a single year is determined to be \$919.75 (as it was in 2019-2020) this is *not* the same as the cost of educating a student during the entirety of their incarceration. The more appropriate measure for our purposes would be the average cost for prisoners who were released, which is \$1,341.

As Aos (2006) pointed out, in order to properly weigh the costs and benefits of different forms of prison education, we need to calculate the costs of different interventions independently. This is especially important given our findings. While college programs are the most effective, they are also likely to be the most expensive. Many college students are completing two- or four-year degrees. Compared to the average ABE length of study of 0.4 years (Cho and Tyler 2013), the costs of these programs should not be expected to be comparable.

Our estimates for the cost of education are presented in Table 4. We use a variety of papers that have provided estimates of the total costs of educating students, instead of the annual costs. Because programs differ in their cost of implementation, we provide separate estimates for ABE, secondary, vocational and college education. ABE and secondary education are often pooled together as "academic" education, so the distinction between the two is not always clear when costs are reported. In each instance where costs for ABE and secondary education were reported independently, they were identical.

The cost numbers show that the costs for non-college education programs are similar. Vocational education costs slightly more, but the difference is small. It would cost the same amount to provide academic education to 50 students as it would to provide vocational education to 47 students. College degree programs appear to be significantly more costly to implement. The average college program costs about \$10,467 for each participant, almost 5 times as much as the per-participant cost for vocational education.

In order to quantify the benefits, we multiply the effects of education by the estimated marginal financial benefit using our estimates of casual effect derived from the sample of papers earning a 3, 4, or 5 SMS score. We estimate the benefits for each group separately, given the effects found in Tables 3 and 4. Since sample size limitations prevent us from estimating the wage effects separately for each category of education, we assume that each participant experiences a boost equal to that of the sample-wide average, a \$131 quarterly earnings increase.

Recidivism

The U.S. five-year recidivism rate is 46%, according to a 2021 report by the Bureau of Justice Statistics (Durose and Antenangeli 2021), which means that the odds ratio is 0.852. This means that a 11% reduction in the odds of recidivism caused by ABE (as seen in Table 2) would lead to a 2.9 percentage point reduction in recidivism. For secondary, vocational, and college students, those decreases are 3.3, 4.31, and 12.74 percentage points respectively.

According to a 2015 Vera institute study, the average cost of housing someone in a state prison was \$33,274.¹¹ When inflated to 2022 dollars, that becomes \$40,028. Given that most of the studies in our sample are for state or local prisons, this estimate is likely a good one for the average annual cost savings from a reduction in incarceration.

According to the Bureau of Justice Statistics, the average length of a prison stay is 2.7 years.¹²

¹¹<https://www.vera.org/publications/price-of-prisons-2015-state-spending-trends>

¹²<https://bjs.ojp.gov/library/publications/time-served-state-prison-2018>

Assuming that this also reflects the average length of stay for the recidivists, the cost savings for every person who is deterred from recidivism due to education is \$107,075. Therefore, a 2.9 percentage point decrease in recidivism means that the providing ABE education leads to an average decrease in prison costs of \$3,105. For secondary, vocational, and college students, education leads to prison-cost decreases of \$3,533, \$4,615, and \$13,641 respectively.

By focusing only on the costs of crime as they relate to prison costs, we are deliberately ignoring the public costs of crime. These costs only reflect those related to the costs of reincarceration, not the costs of the crime itself, including the costs to victims, police or court costs, or the costs to criminals' families. Our decision to not include a calculation of these costs is not due to any belief that they are small, but instead due to the tremendous complexity relating to their calculation. Cost of crime estimates have large variation, depending on the underlying assumptions or estimation strategies chosen by researchers. There is also significant variation in estimates of the number of crimes committed per criminal, which would affect any estimate of the crime costs associated with re-incarceration.

To apply these estimates of crime to a cost-benefit analysis here is further complicated by the fact that people who are re-incarcerated are not a representative sample of criminals. It is possible that the cost of crimes associated with recidivists is lower than the average, given that many are on parole and can be considered recidivists due to technical violations or minor crimes that would not normally warrant a return to prison. On the other hand, people who were released from prison are more likely to have committed a serious crime in the first place, and potentially more likely to commit a serious crime again. We would need to gather more evidence to determine the average cost of crime for this subset of offenders. Such questions awaits future research. Finally, including these costs of crime estimates would do nothing to change our base result that each form of education provides positive economic returns to the criminal justice system, even when we define those benefits narrowly as the cost savings from a reduction in recidivism.

Employment & Wages

For employment, we must first consider that only those not incarcerated can be employed. Therefore, we must first recognize that we are only considering the 61.4% of released prisoners who were not re-incarcerated. According to the U.S. Department of Justice, the 3-year re-incarceration rate is 38.6% (Durose and Antenangeli 2021). Using an estimate by Prison Policy of a 73% employment-rate for released prisoners,¹³ we calculate that 44.8% of people released from prison will be employed, which we get from multiplying the 73% employment rate by the 61.4% of released prisoners who do not recidivate.

Using the baseline employment rate of 44.8%, we estimate that the 2.7% increase in the odds ratio for employment cause by participation in ABE courses leads to a 0.66 percentage point increase in post-release employment. This means that for every 100 students who participate in prison ABE programs, about 0.66 additional people will be employed, against the counterfactual of no education program. For secondary, vocational, and college education, we estimate employment increases of 0.54, 2.48, and 4.68 percentage points, respectively.

To calculate the benefit of increased employment, we use a baseline measure of quarterly wages of \$5,600. This comes from a measure obtained from Department of Justice of prisoners released from federal prisons (Carson et al. 2021). Using this number, we calculate the the 0.66 percentage point increase in employment due to ABE participation leads to \$36.96 quarterly increase in economic gains per student educated in prison. For secondary, vocational, and college education, we estimate employment leads to wage increases of \$30.24, \$138.88, and \$262.08, respectively. Note that these gains are independent of the wage increases, which represent increases in income due to increases in either hourly wages or hours worked, not due to an increase in employment.

The wage effect is potentially much broader, since it can affect not only people who found work *because* of a prison program, but it potentially increased wages for those who would have found work anyway. The quarterly economic benefits of education via wages is \$131.05 for each employed

¹³<https://www.prisonpolicy.org/reports/outofwork.html>

released prisoner. Starting with a baseline 44.8% employment rate, we calculate the post-release employment rate for those receiving ABE, secondary, vocational, or college education to be 45.46%, 45.34%, 47.28%, and 49.48%, respectively. We then multiply each of these numbers to determine the quarterly wage increase for the average education participant for each of these 4 types of education: \$59.58, \$59.42, \$61.96, and \$64.84. By adding these to the benefits of increased employment, we calculate the quarterly total earnings increase for each of these 4 types of education to be: \$96.54, \$89.66 \$200.84, and \$326.92 for ABE, secondary, vocational and college education respectively.

But how long do these benefits last? To fully determine the value of education via employment, we must additionally estimate the current value of the increased income stream that is realized in the future. The estimated effect of education on wages and employment depend on how we discount future values and the decay of positive economics effects.

Tyler and Kling (2006) find that the positive wage and employment benefits of education mostly faded by the third year following release. Using this figure, while also considering standard present discounting of future streams of revenue, we assume a quarterly decay rate of 10%. This means that the \$96.54 economic benefit via ABE becomes \$86.89¹⁴ in the second quarter following release, \$78.20 in the third quarter, and so on. By the end of the 3rd year, this decay would mean that the economic gain would be about \$36.17. Using this framework, we calculate the present value of education via wages and employment over 20 years. We calculate the benefit of education via wages and employment for ABE, secondary, vocational, and college education to be \$950.91, \$883.14, \$1,978.25, \$3,220.11 respectively.

ROI Calculations

Table 5 shows the ROI estimates for each of our types of education. While each of the four types of education appear to yield positive returns, there is significant variation in the benefits, relative to both the money spent on education and on a per-participant basis.

¹⁴\$96.54*.9

ABE yields an estimate 104.12% return on educational investment. This means that each dollar spent on education creates benefits yielding \$2.04, either in terms of cost savings associated with incarceration increased future earning for the prisoner. Secondary education yields a similar ROI of 122.25%. The economic return to vocational education is the highest, at 210.12%. While the ROI for college (61.09%) is low compared to all other forms of education, this is due to the high costs, not due to low benefits to education. If we instead focus on which form of education yields the highest benefit per participant, it is clearly college education. The average investment in a college participant will yield \$ in benefits, which is \$6,396 net of costs, which is by far the highest per-student return.

One clear result is that the primary economics benefit of prison education works through the reduction in recidivism. Given the relatively low rates of employment and wages of released prisoners, the marginal impacts of education on employment measures is relatively small, especially when compared to the high costs of crime and incarceration. This means that even the most myopic view on the benefits of education (one that looks only at prison costs, ignoring the positive effects on prisoners' future wages and the social benefits of avoiding future crimes) would still find a significant positive return to most forms of prison education systems. For all groups of programs studied here, the cost-savings via a reduction in recidivism means that governments can reduce their incarceration-related costs by investing in prisoner education.

Our results also show that prison education can be described as a positive externality. Only vocational education appears to yield economic benefit for the participant similar to the cost of implementation. Most of the benefits are experienced by others, a classic example of an externality. This also means that if prisoners were asked to pay the full price of tuition, many may rationally choose to abstain, even if the education has a positive (and even large) positive return. Because most of the benefits of prison education are experienced by the larger society (via fewer people in prisons), our results provide support for the efficacy of public funding for prison education.

Conclusion

Using the largest and most comprehensive set of papers used in a meta-analysis to date, we estimate the effect of prison education on a variety of outcomes and use those estimates to calculate an economic return to spending on prison education. While we find that prison education leads to significant decreases in recidivism, increases in employment, and modest increases in wages, significant variation exists across different types of education.

The breadth of our analysis yields provides numerous insights into public policy regarding prison education beyond the baseline result that prison education programs have paid for themselves, which confirms results found in previous studies. First, we find that the benefits of prison education via re-incarceration have been dropping in recent years. Whether this is because recent papers are of higher quality, and therefore less likely to provide biased estimates of causal effect, or because the true effect of education is decreasing, this trend has an important implication for policy-makers. The numbers presented above should be seen as retrospective, but may be an unrealistic expectation for future programs. However, even with a more modest estimate of effect on recidivism, we still estimate that prison education will provide significant economic and cost-saving benefits.

Second, public money will be particularly well-spent on vocational education. Given it's high rate of return. Each dollar spent on vocational education reduces future incarceration costs by almost \$2.17. Additionally, vocational education can be taken alongside academic education, meaning that participation in one does not preclude participation in another helpful program.

Third, prisons can increase the returns to these programs by helping students transition from one form of education to another. For example, the easier it is for prisoners to transition from a GED program to a college program, the more beneficial the GED program will be, as it will allow students to tap into a form of education (post-secondary) that, we find, yields the highest benefit of a per-participant basis.

Finally, policy-makers must consider how the costs and benefits will change as programs expand. Prison education programs feature high fixed costs and low marginal costs. As a result, the costs of programs appear to vary significantly on participation rates. The Windham School District, which serves the majority of Texas prisoners, has a cost-per-participant that is a fraction of those estimates in other programs. Vermont estimated that, at one point, a low-participation rate was doubling the per-student cost of education.

But just as the marginal costs will likely drop as enrollment expands, we should expect the efficacy of education to decrease, too. Students who are currently enrolled in education are likely to be those who stand to benefit the most from education itself. As programming expands, the marginal benefit is likely to decrease, as education services are provided to students for whom the benefit is lower than average.

Similarly, the costs of incarceration are likely to be affected by the prison population size. If smaller prison populations caused by education result in half-empty prisons with high fixed costs, it will result in higher per-prisoner costs, which would eat away at the economic benefits of decreased recidivism. This means that the cost-savings we estimate can only be fully realized if prisons can respond to smaller prison populations by decreasing operating costs.

Of course, a cost-benefit analysis should only be one factor considered when determining the optimal level of prison education. Aside from all the benefits that cannot be calculated (second-order effects for families of students, non-monetary effect), many prison education programs were developed to address perceived inequalities. The mere existence of non-profits, funded by people who expect no monetary return on their contributions, speaks to a desire to provide education beyond an economic return. While cost-benefit analyses are a necessary part of policy selection, they are not meant to fully determine what that policy should be.

References

- Adams, Kenneth, Katherine J. Bennett, Timothy J. Flanagan, James W. Marquart, Steven J. Cuvelier, Eric Fritsch, Jurg Gerber, Dennis R Longmire and Velmer S. Jr. Burton. 1994. "A large-scale multi-dimensional test of the effect of prison education programs on offenders' behavior." *The Prison Journal* 74(4):433-449.
- Allen, Robert. 2006. "An economic analysis of prison education programs and recidivism." Emory University, Department of Economics.
- Anderson, Dennis B. 1982. "The Relationship Between Correctional Education and Parole Success." *Journal of Offender Counseling Services Rehabilitation* 5(3-4):13-26.
- Anderson, Dennis B., R.E. Schumacker and S.L. Anderson. 1991. "Releasee characteristics and parole success." *Journal of Offender Rehabilitation* 17(1-2):133-145.
- Andrews, D.A., Ivan Zinger, Robert D. Hoge, James Bonta, Paul Gendreau and Francis T. Cullen. 1990. "Does Correctional Treatment Work? A Clinically Relevant and Psychologically Informed Meta-Analysis." *Criminology* 28(3):369-404.
- Aos, Steve, Marna Miller and Elizabeth Drake. 2006. "Evidence-Based Adult Corrections Programs: What Works and What Does Not." *Washington State Institute for Public Policy, 06-01-1201* .
- Aos, Steve, Polly Phipps, Robert Barnoski and Roxanne Lieb. 2001. "The Comparative Costs and Benefits of Programs to Reduce Crime: Version 4.0." Washington State Institute for Public Policy.
- Apel, R. and G. Sweeten. 2010. "The Impact of Incarceration on Employment during the Transition to Adulthood." *Social Problems* 50(3):448-479.
- Armstrong, Gaylene and Cassandra Atkin-Plunk. 2014. "Evaluation of the Windham School District Correctional Education Programs – SY2010." Sam Houston State University.
- Armstrong, Gaylene, Dennis Giever and Daniel Lee. 2012. "Evaluation of the Windham School District Correctional Education Programs." Sam Houston State University.
- Batiuk, Mary Ellen, Karen F. Lahm, Matthew McKeever, Norma Wilcox and Pamela Wilcox. 2005. "Disentangling the effects of correctional education: are current policies misguided? An event history analysis." *Criminal Justice* 5(1):55-74.
- Blackburn, Fredrick Stoll. 1981. "The Relationship Between Recidivism and Participation in a Community College Program for Incarcerated Offenders." *Journal of Correctional Education* 32(3):23-25.

- Blackhawk Technical College. 1996. "RECAP (Rock County Education and Criminal Addictions Program) Program Manual, Prepared to Be of Assistance in Program Replication." Blackhawk Technical College.
- Bozick, R., J. Steele, L. Davis and S. Turner. 2018. "Does providing inmates with education improve postrelease outcomes? A meta-analysis of correctional education programs in the United States." *Journal of Experimental Criminology* 14(3):389–428.
- Brewster, Dennis R. and Susan F. Sharp. 2002. "Educational Programs and Recidivism in Oklahoma: Another Look." *The Prison Journal* 82(3):314–334.
- Bueche, James K. Jr. 2014. Adult offender recidivism rates: how effective is pre-release and vocational education programming and what demographic factors contribute to an offenders return to prison PhD thesis Louisiana State University.
- Burke, Lisa Ouimet and James E. Visian. 2001. "The Effect of College Programming on Recidivism Rates at the Hampden County House of Correction: A 5-Year Study." *Journal of Correctional Education* 52(4):160–162.
- Carson, E. Anne, Danielle H. Sandler, Renuja Bhaskar, Leticia E. Fernandez and Sonya R. Porter. 2021. "Employment of Persons Released from Federal Prison in 2010." U.S. Department of Justice, Office of Justice Programs, Bureau of Justice Statistics.
- Chappell, Cathryn A. 2003. Post-Secondary Correctional Education and Recidivism: A Meta-Analysis of Research Conducted 1990-1999 PhD thesis University of Cincinnati.
- Chattoraj, BN. 1985. "Social, Psychological and Economic Consequences of Imprisonment." *Social Defense* 20(79):19–24.
- Cho, Rosa and John Tyler. 2008. "Prison-based Adult Basic Education (ABE) and Post-release Labor Market Outcomes."
- Cho, Rosa Minhyo and John H. Tyler. 2013. "Does Prison-Based Adult Basic Education Improve Postrelease Outcomes for Male Prisoners in Florida?" *Crime & Delinquency* 59(7):915–1005.
- Clarke, David D. 1991. "Analysis of return rates of the Inmate College Program Participants." New York State Department of Correctional Services.
- Coffey, Betsy Bramlett. 1983. The effectiveness of vocational education in Kentucky's correctional institutions: as measured by employment status and recidivism PhD thesis University of Kentucky.
- Cook, Thomas and Donald T. Campbell. 1979. *Quasi-Experimentation*. Rand-McNally.
- Cronin, Jake. 2011. "The Path to Successful Reentry: The Relationship Between Correctional Education, Employment and Recidivism." Institute of Public Policy, Harry S Truman School of Public Affairs.

- Darolia, Rajeev, Peter Mueser and Jacob Cronin. 2021. "Labor market returns to a prison GED." *Economics of Education Review* 82:1–27.
- Davis, L.M., R. Bozick, J.L. Steele, J. Saunders and J.N.V. Miles. 2013. *Effectiveness of Correctional Education: A Meta-Analysis of Programs That Provide Education to Incarcerated Adults*. RAND Corporation.
- Davis, Steven and Bill Chown. 1986. "Recidivism among offenders incarcerated by the Oklahoma Department of Corrections who received vocational-technical training: a survival data analysis of offenders released January 1982 through July 1986." Oklahoma State Department of Corrections.
- Denney, Matthew G.T. and Robert Tynes. 2021. "Social, The Effects of College in Prison and Policy Implications." *Justice Quarterly* 38(7):1542–1566.
- Department of Corrections Services. 2010. "Follow-Up Study of Offenders Who Earned High School Equivalency Diplomas (GEDs) While Incarcerated in DOCS.". New York Department of Corrections Services.
- DerSimonian, R. and N. Laird. 1986. "Meta-analysis in clinical trials." *Controlled Clinical Trials* 7:177–188.
- Dickman, Cynthia. 1987. "Academic Program Participation and Prisoner Outcomes." Michigan Department of Corrections, Facilities Research and Evaluation Units.
- Division of Program Planning, Research & Evaluation . 1992. "Overview of department follow-up research on return rates of participants in major programs." New York State Department of Correctional Services.
- Downes, E., K. Monaco and S. Schreiber. 1989. Evaluating the effects of vocational education on inmates: a research model and preliminary results. In *The Yearbook of Correctional Education*, ed. S. Dugiod. Simon Fraser University p. 249–262.
- Durose, Matthew R. and Leonardo Antenangeli. 2021. "Recidivism of Prisoners Released in 34 States in 2012: A 5-Year Follow-Up Period (2012–2017)." U.S. Department of Justice, Office of Justice Programs, Bureau of Justice Statistics.
- Duwe, Grant and Valerie Clark. 2014. "The Effects of Prison-Based Educational Programming on Recidivism and Employment." *The Prison Journal* 94(4):454–478.
- Egger, M., G.D. Smith, M. Schneider and C. Minder. 1997. "Bias in Metaanalysis Detected by a Simple, Graphical Test." *British Medical Journal* 315:629—634.
- Ellison, Mark, Kirstine Szifris, Rachel Horan and Chris Fox. 2017. "A Rapid Evidence Assessment of the effectiveness of prison education in reducing recidivism and increasing employment." *Probation Journal* 64(2):108–128.
- Farrington, D.P., D.C. Gottfredson, L.W. Sherman and B.C. Welsh. 2002. *Evidence-based crime prevention*. Routledge chapter The Maryland Scientific Methods Scale.

- Fine, Michelle, Maria Elena Torre, Kathy Boudin, Iris Bowen, Judith Clark, Donna Hylton, Migdalia Martinez, “Missy”, Rosemarie A. Roberts, Pamela Smart and Debora Upegui. 2001. “Changing Minds: The Impact of College in a Maximum-Security Prison.” The Graduate Center of the City University of New York & Women in Prison at the Bedford Hills Correctional Facility.
- Fowles, Richard and Matt Christensen. 1995. “A Statistical Analysis of Project Horizon: The Utah Corrections Education Recidivism Reduction Plan.”.
- Gaither, Carl Clifford. 1980. “An evaluation of the Texas Department of Corrections’ Junior College Program.”.
- Gordon, Howard R. D. and Bracie Weldon. 2003. “The Impact of Career and Technical Education Programs on Adult Offenders: Learning Behind Bars.” *The Journal of Correctional Education* 54(4):200–209.
- Harer, M. D. 1995. “Prison education program participation and recidivism: a test of the normalization hypothesis.” Federal Bureau of Prisons, Office of Research and Evaluation.
- Hill, Leslie and William D Scaggs, Samuel J. A. . Bales. 2017. “Assessing the statewide impact of the Specter Vocational Program on reentry outcomes: A propensity score matching analysis.” *Journal of Offender Rehabilitation* 56(1):61–86.
- Hjalmarsson, Randi. 2008. “Criminal Justice Involvement and High School Completion.” *Journal of Urban Economics* 63(2):613–630.
- Holloway, Jerry and Paul Moke. 1986. “Post secondary correctional education: an evaluation of parolee performance.” Wilmington College.
- Hopkins, Arnold J. 1988. “Maryland Department of Public Safety and Correctional Services, Offender recidivism report.” Maryland Department of Public Safety and Correctional Services.
- Hull, Kim A., Stewart Forrester, James Brown, David Jobe and Charles McCullen. 2000. “Analysis of Recidivism Rates for Participants of the Academic/Vocational/Transition Education Programs Offered by the Virginia Department of Correctional Education.” *Journal of Correctional Education* 51(2):256–261.
- Ismailova, Zarona. 2007. “Prison Education Program Participation and Recidivism.”.
- Jensen, Eric L., Christopher J. Williams and Stephanie L. Kane. 2020. “Do In-Prison Correctional Programs Affect Postrelease Employment and Earnings?” *International Journal of Offender Therapy and Comparative Criminology* 64(6-7):674–690.
- Johnson, Candace Marie. 1984. The effects of prison labor programs on post-release employment and recidivism PhD thesis Florida State University.

- Kelso, Charles E. 1996. "A study of the recidivism of Garrett Heyns Education Center graduates released between 1985 and 1991." *Journal from the Northwest Center for the Study of Correctional Education* 1(1):25–44.
- Kim, Ryang Hui and David Clark. 2013. "The effect of prison-based college education programs on recidivism: Propensity Score Matching approach." *Journal of Criminal Justice* 41:196–204.
- La Roi, Samuel George. 2022. "Correctional Education: A Pathway to Reducing Recidivism in o Reducing Recidivism in Wisconsin?".
- Lanaghan, Patrick. 1998. "The Impact of Receiving a General Equivalency Diploma While Incarcerated on the Rate of Recidivism."
- Langenbach, M., M. Y. North, L. Aagaard and W. Chown. 1990. "Televised instruction in Oklahoma prisons: a study of recidivism and disciplinary actions." *Journal of Correctional Education* 41(2):87–94.
- Lattimore, P. K., A. D. Witte and J. R. Baker. 1990. "Experimental assessment of the effect of vocational training on youthful property offenders." *Evaluation Review* 14(2):115–133.
- Lee, Hedwig, Lauren C. Porter and Megan Comfort. 2004. "Consequences of Family Member Incarceration: Impacts on Civic Participation and Perceptions of the Legitimacy and Fairness of Government." *The ANNALS of the American Academy of Political and Social Science* 651(1):44–73.
- Lichtenberger, Eric J. 2007. "The Impact of Vocational Programs on Post-Release Outcomes for Full Completers from the Fiscal Year 1999, 2000, 2001, and 2002 Release Cohorts." Pennsylvania Department of Corrections.
- Lichtenberger, Eric J. 2011. "Measuring the Effects of the Level of Participation in Prison-Based Career and Technical Education Programs on Recidivism."
- Lichtenberger, Eric J., Patrick A. O'Reilly, Yasuo , Miyazaki and Rosemaliza Mohd Kamulladeen. 2009. "Direct and Indirect Impacts of Career and Technical Education on Post-Release Outcomes." Center for Assessment, Evaluation, and Educational Programming , Virginia Tech.
- Lipsey, M W and D B Wilson. 1993. "The efficacy of psychological, educational, and behavioral treatment. Confirmation from meta-analysis." *American Psychologist* 48(12):1181–1209.
- Lochner, Lance and Enrico Moretti. 2004. "The Effect of Education on Crime: Evidence from Prison Inmates, Arrests, and Self-Reports." *American Economic Review* 94(1):155–189.
- Lockwood, D. 1991. Prison higher education and recidivism: a program evaluation. In *The Yearbook of Correctional Education*, ed. S. Dugiod. Simon Fraser University p. 187–201.
- Long, Joshua S., Carrie Sullivan, John Woolridge, Amanda Pompoco and Melissa Lugo. 2019. "Matching Needs to Services: Prison Treatment Program Allocations." *CRIMINAL JUSTICE AND BEHAVIOR* 46(5):674–696.

- Lopez, Amy K. 2020. The impact of career and technical education program outcomes in the Windham School District on offender post-release employment status PhD thesis Sam Houston State University.
- MacKenzie, D. 2006. *What Works in Corrections: Reducing the Criminal Activities of Offenders and Delinquents*. Cambridge University Press.
- Marckley, Houston, Kevin Flynn and Sharon Bercaw-Dooen. 1983. "Offender skills training and employment success: an evaluation of outcomes." *Corrective and Social Psychiatry and Journal of Behavior Technology, Methods and Therapy* 29(1):1–11.
- Martinez, Alma I. and Michael Eisenberg. 2000a. "Impact of Educational Achievement of Inmates in the Windham School District on Post-Release Employment." Criminal Justice Policy Council.
- Martinez, Alma I. and Michael Eisenberg. 2000b. "Impact of Educational Achievement of Inmates in the Windham School District on Recidivism." Criminal Justice Policy Council.
- Martinson, Robert. 1974. "What works? Questions and answers about prison reform." *The Public Interest* 35:22–54.
- Nally, John, Susan Lockwood, Katie Knutson and Taiping Ho. 2012. "An Evaluation of the Effect of Correctional Education Programs on Post-Release Recidivism and Employment: An Empirical Study in Indiana." *The Journal of Correctional Education* 63(1):69–89.
- Nuttall, John, Linda Hollmen and E. Michele Stale. 2003. "The Effect of Earning a GED on Recidivism Rates." *Journal of Correctional Education* 54(3):90–94.
- O'Neil, Marian. 1990. "Correctional Higher Education: Reduced Recidivism?" *Journal of Correctional Education* 41(1):9–12.
- Perry, Claire. 2014. "Vocational and Educational Programs: Impacts on Recidivism." Undergraduate Thesis, Haverford College.
- Piehl, Anne Morrison. 1994. "Learning While Doing Time." Malcolm Wiener Center for Social Policy, John F. Kennedy School of Government, Harvard University.
- Pompoco, Amanda, John Wooldredge, Melissa Lugo, Carrie Sullivan and Edward J. Latessa. 2017. "Reducing Inmate Misconduct and Prison Returns with Facility Education Programs." *Criminology & Public Policy* 16(2):515–547.
- Roessger, Kevin M., Xinya Liang, James Weese and Daniel Parker. 2021. "Examining Moderating Effects on the Relationship Between Correctional Education and Post-Release Outcomes." *The Journal of Correctional Education* 81(1):13–42.

- Ryan, Thomas R. and Joseph R. Desuta. 2000. "A Comparison of Recidivism Rates for Operation Outward Reach (OOR) Participants and Control Groups of Non-Participants for the Years 1990 Through 1994." *The Journal of Correctional Education* 51(4):316–319.
- Sabol, William J. 2007. Local labor market conditions and post-prison employment: Evidence from Ohio. In *Barriers to Reentry? The Labor Market for Released Prisoners in Post-Industrial America*, ed. Shawn Bushway, Michael A. Stoll and David A. Weiman. Russell Sage Foundation pp. 257–303.
- Saylor, William G. and Gerald G. Gaes. 1997. "PREP: Training Inmates through Industrial Work Participation, and Vocational and Apprenticeship PREP: Training Inmates through Industrial Work Participation, and Vocational and Apprenticeship Instruction." *Corrections Management Quarterly* 1(2):32–43.
- Schumacker, R.E., D.B. Anderson and S.L. Anderson. 1990. "Vocational and Academic Indicators of Parole Success." *Journal of Correctional Education* 41(1):8–13.
- Shlafer, Rebecca J., Tyler Reedy and Laurel Davis. 2017. "Outcomes Among Youth With Incarcerated Parents: Differences by School Setting." *J Sch Health*. 87(9):687–695.
- Smith, Linda G. 2005. "Pennsylvania Department of Corrections Education Outcome Study." Correctional Education Association.
- Smith, Matthew J., Brittani Parham, Jamie Mitchell, Shannon Blajeski, Meghan Harrington, Brittany Ross, Jeffery Johnson, Daphne M. Brydon, Jennifer E. Johnson, Gary S. Cuddeback, Justin D. Smith, Morris D. Bell, Robert McGeorge, Kyle Kaminski, Aaron Suganuma and Sheryl Kubiak. 2022. "Virtual Reality Job Interview Training for Adults Receiving Prison-Based Employment Services A Randomized Controlled Feasibility and Initial Effectiveness Trial." *Criminal Justice and Behavior* Forthcoming.
- Sterne, Jonathan A C, Alex J Sutton, John P A Ioannidis, Norma Terrin, David R Jones, Joseph Lau, James Carpenter, Gerta Rücker, Roger M Harbord, Christopher H Schmid, Jennifer Tetzlaff, Jonathan J Deeks, Jaime Peters, Petra Macaskill, Guido Schwarzer, Sue Duval, Douglas G Altman, David Moher and Julian P T Higgins. 2011. "Recommendations for examining and interpreting funnel plot asymmetry in meta-analyses of randomised controlled trials." *The BMJ* 343.
- Steurer, Stephen J., Linda G. Smith and Alice Tracy. 2003. "Education Reduces Crime: Three-State Recidivism Study." Correctional Education Association and Management Training Corporation Institute.
- Torre, Maria Elena and Michelle Fin. 2005. "Bar None: Extending Affirmative Action to Higher Education in Prison." *Journal of Social Issues* 61(3):569–594.
- Tyler, John H. and Jeffrey R. Kling. 2006. "Prison-based Education and Re-entry into the Mainstream Labor Market." National Bureau of Economic Research, NBER Working Paper 12114.

- Visher, Christy A., Pamela K. Lattimore, Kelle Barrick and Stephen Tueller. 2017. "Evaluating the Long-Term Effects of Prisoner Reentry Services on Recidivism: What Types of Services Matter?" *Justice Quarterly* 34(1):136–165.
- Visher, Christy A., Sara A. Debus-Sherrill and Jennifer Yahner. 2011. "Employment After Prison: A Longitudinal Study of Former Prisoners." *Justice Quarterly* 28(5):698–718.
- Visher, Christy A. and Vera Kachnowski. 2007. Finding Work on the Outside: Results from the "Returning Home" Project in Chicago. In *Barriers to Reentry?: The Labor Market for Released Prisoners in Post-Industrial America*, ed. Shawn Bushway, Michael A. Stoll and David F. Weiman. Russell Sage Foundation pp. 80–114.
- Wang, Eugene W. 2017. "WSD Biennial Evaluation and Report." Texas Tech University College of Human Sciences.
- Wang, Eugene W. 2018. "WSD Executive Summary." Texas Tech University College of Human Sciences.
- Wang, Eugene W. 2021. "WSD Biennial Evaluation and Report." Texas Tech University College of Human Sciences.
- Werholtz, Roger. 2009. "Offender Programs Evaluation, Volume VIII." Kansas Department of Corrections.
- Wilson, D.B., C.A. Gallagher and D.L. Mackenzie. 2000. "A Meta-Analysis of Corrections-Based Education, Vocation, and Work Programs for Adult Offenders." *Journal of Research in Crime and Delinquency* 37(4):347–368.
- Winterfield, Laura, Mark Coggeshall, Michelle Burke-Storer, Vanessa Correa and Simon Tidd. 2009. "The Effects of Postsecondary Correctional Education Final Report." Urban Institute Justice Policy Center.
- Zgoba, Kristen M., Sabrina Haugebrook and Krista Jenkins. 2008. "The Influence of GED Obtainment on Inmate Release Outcome." *Criminal Justice and Behavior* 35(3):375–387.

Table 1: Papers Included by Outcome & SMS Score

Panel A: Recidivism Outcome		
	Papers	Estimates
SMS: 5	1	1
SMS: 5, 4	15	24
SMS: 5, 4, 3	40	69
SMS: 5, 4, 3, 2	69	100

Panel B: Employment Outcome		
	Papers	Estimates
SMS: 5	1	1
SMS: 5, 4	8	10
SMS: 5, 4, 3	19	22
SMS: 5, 4, 3, 2	30	36

Panel C: Wages Outcome		
	Papers	Estimates
SMS: 5	0	0
SMS: 5, 4	4	5
SMS: 5, 4, 3	8	11
SMS: 5, 4, 3, 2	9	12

Table provides the sample for the papers used in this analysis for each of the 3 outcomes measured, broken up by their scores on the Maryland Scientific Method Scores (SMS) (Farrington et al. 2002). The number of estimates exceeds the number of papers because many papers provide numerous estimates, such as separate estimates for the effect of vocational and secondary education.

Table 2: Effect on Education on Recidivism

Panel A: All Education Types, Effect by SMS Score			
SMS Sample	Odds Ratio	95% CI	N
4 & 5	0.828***	[0.757, 0.905]	24
3, 4 & 5	0.809***	[0.766, 0.854]	62
2, 3, 4 & 5	0.757***	[0.720, 0.795]	100
Panel B: Effect by Education Type (SMS Scores 3, 4, 5)			
Education Type	Odds Ratio	95% CI	N
Adult Basic Education	0.890**	[0.811, 0.976]	17
Secondary	0.875***	[0.807, 0.950]	23
Vocational	0.839***	[0.795, 0.86]	30
College	0.585***	[0.461, 0.749]	16

Notes: Panel A of the table shows the meta-analysis results for studies estimating the effect of education on recidivism for subsamples of papers scoring different grades on the Maryland scientific methods scale (SMS). Panel B shows the estimates of different types of education, using only papers that scored 3, 4, or 5 on the Maryland scientific methods scale. Both Panels include along with the 95% confidence interval and the number of estimates used in the analysis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Effect on Education on Employment

Panel A: All Education Types, Effect by SMS Score			
SMS Sample	Odds Ratio	95% CI	N
4 & 5	1.122***	[1.048, 1.204]	10
3, 4 & 5	1.085***	[1.041, 1.133]	22
2, 3, 4 & 5	1.134***	[1.090, 1.180]	36
Panel B: Effect by Education Type (SMS Scores 3, 4, 5)			
Education Type	Odds Ratio	95% CI	N
Adult Basic Education	1.027	[0.976, 1.081]	7
Secondary	1.022	[0.938, 1.113]	8
Vocational	1.105**	[1.009, 1.232]	13
College	1.207	[0.609, 1.060]	1

Notes: Panel A of the table shows the meta-analysis results for studies estimating the effect of education on employment for subsamples of papers scoring different grades on the Maryland scientific methods scale (SMS). Panel B shows the estimates of different types of education, using only papers that scored 3, 4, or 5 on the Maryland scientific methods scale. Both Panels include along with the 95% confidence interval and the number of estimates used in the analysis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Cost of Education

Study	ABE	Secondary	Vocational	College
Aos et al. (2001)	\$3,287 ^a	\$3,287	\$3,264	-
Hudson Link (2022)	-	-	-	\$12,500 ^b
Jackson College	-	-	-	\$12,992 ^c
Cho (2013)	\$2,361 ^d	\$2,361	-	-
WSIPP (2019)	\$1,470 ^e	\$1,470	\$1,759	\$1,470
Bard College	-	-	-	\$18,000 ^f
WSD (2020)	\$1,461 ^g	\$1,461	\$1,461	-
Fowles (1995)	-	-	\$2,202	-
THEI (2022)	-	-	-	\$7,420
Werholtz (2009)	\$1,355	\$1,355	\$1,945	-
AVERAGE	\$1,987	\$1,987	\$2,126	\$10,467

Table provides measures of the cost per participant for each type of education. The measurements are for the full cost of participation, not participation per year. All numbers are inflated to 2020 values.

^a: <https://www.bop.gov/resources/pdfs/wsipp-cost-benefit-summary.pdf>

^b: <https://hudsonlink.org/about/history/>

^c: <https://www.jccmi.edu/jcccp/paying-for-cep/>

^d: The authors calculate the cost to be lower, as they point out that the average ABE participant only takes 0.4 years worth of classes. But as the cost estimates are based on how many people participated, the fact that shorter spells of education are less costly is already built into the calculations.

^e: <http://www.wsipp.wa.gov/BenefitCost>

^f: <https://bpi.bard.edu/debate-what-happened-next/>

^g: <http://www.wsipp.wa.gov/BenefitCost>

Table 5: Cost-Benefit Estimates

Education Type	Cost	Effect on Recidivism	Cost-Savings Recidivism	Effect on Employment	Benefit: Employment	ROI
ABE	-\$1,987	-2.9	\$3,105	0.66	\$951	104.12%
Secondary	-\$1,987	-3.3	\$3,533	0.54	\$883	122.25%
Vocational	-\$2,126	-4.31	\$4,615	2.48	\$1,978	210.12%
College	-\$10,467	-12.74	\$13,641	4.68	\$3,220	61.09%

Table provides the economic returns of prison education programs for both the prison and prisoners. Costs are based on the average costs estimated in Table 4, while the estimates are based on the estimated effects of education outlined in the paper. Effects are percentage point terms, meaning the number of people who will be affected if 100 people receive education.

Figure 1: Forest Plots. Outcome: Recidivism

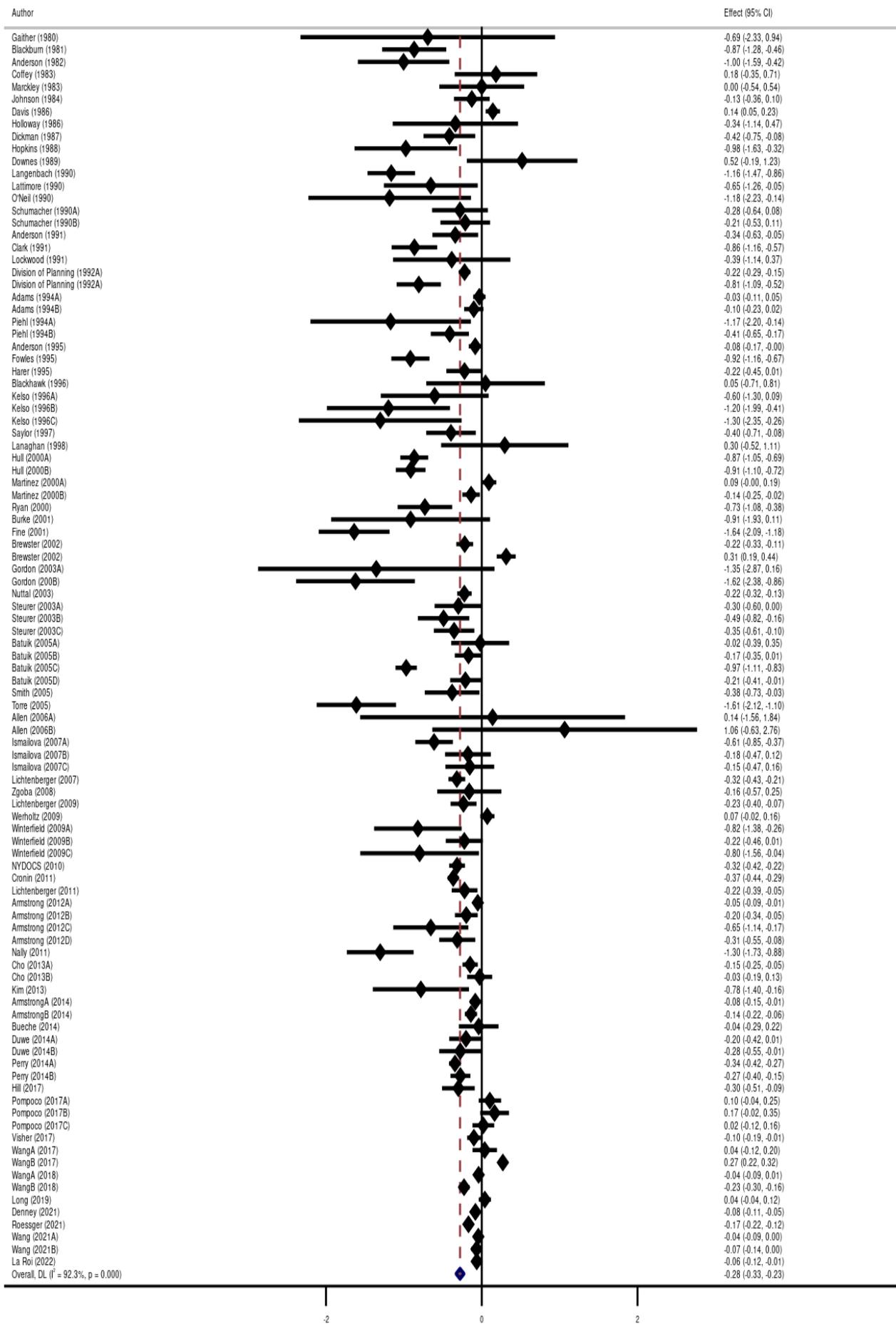


Figure 2: Forest Plots. Outcome: Employment

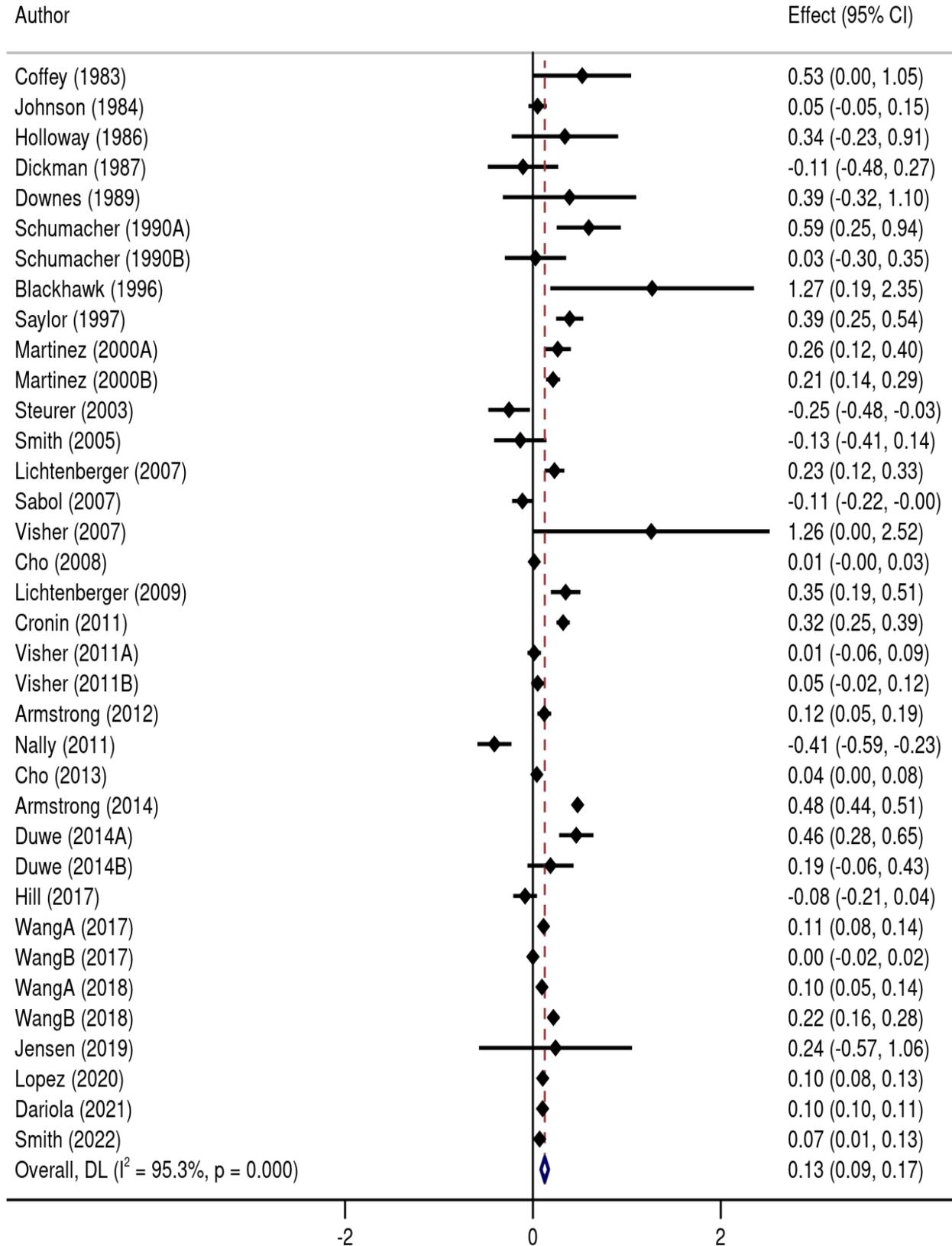


Figure 3: Forest Plots. Outcome: Earnings

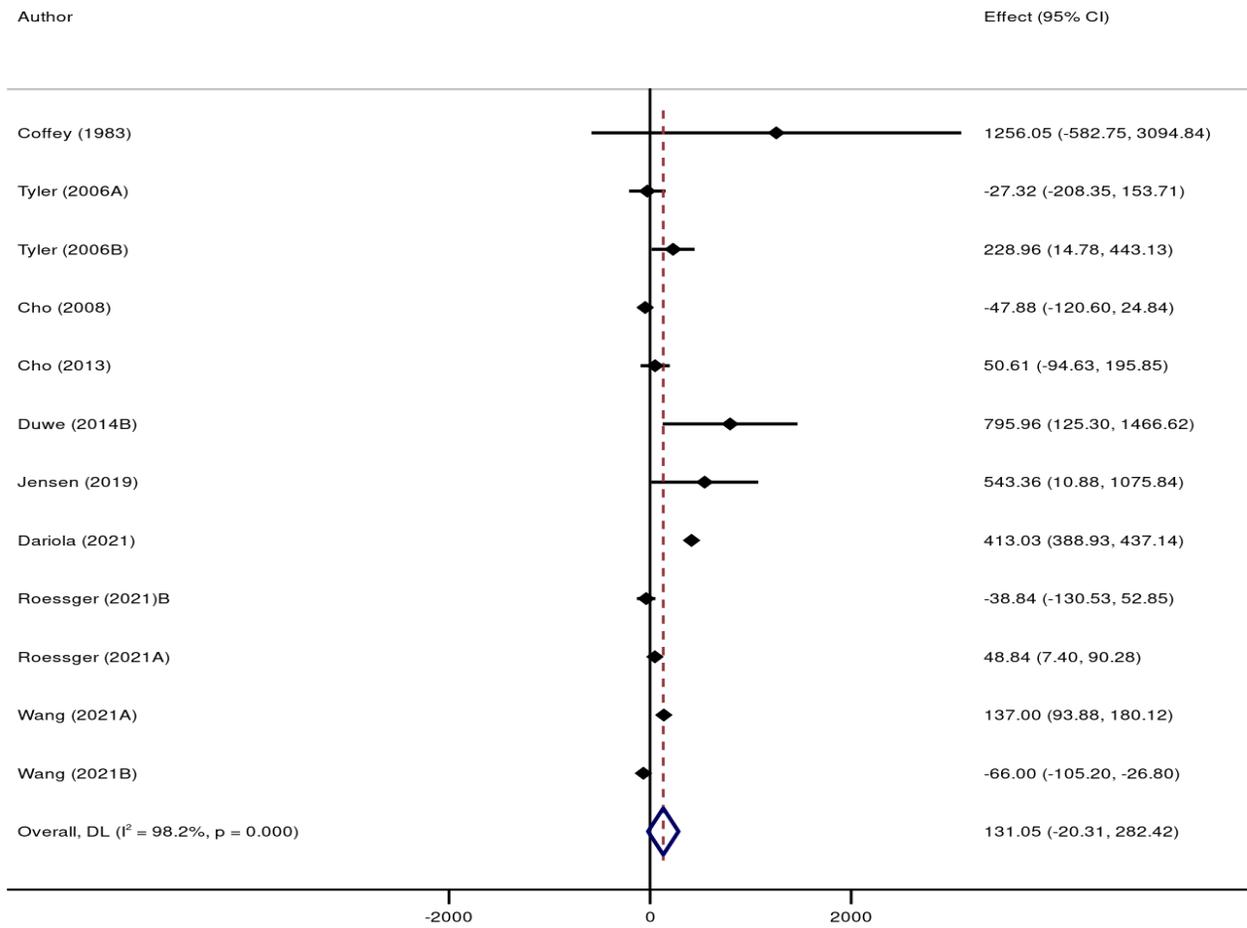


Figure 4: Funnel Plot Robustness Check: Recidivism

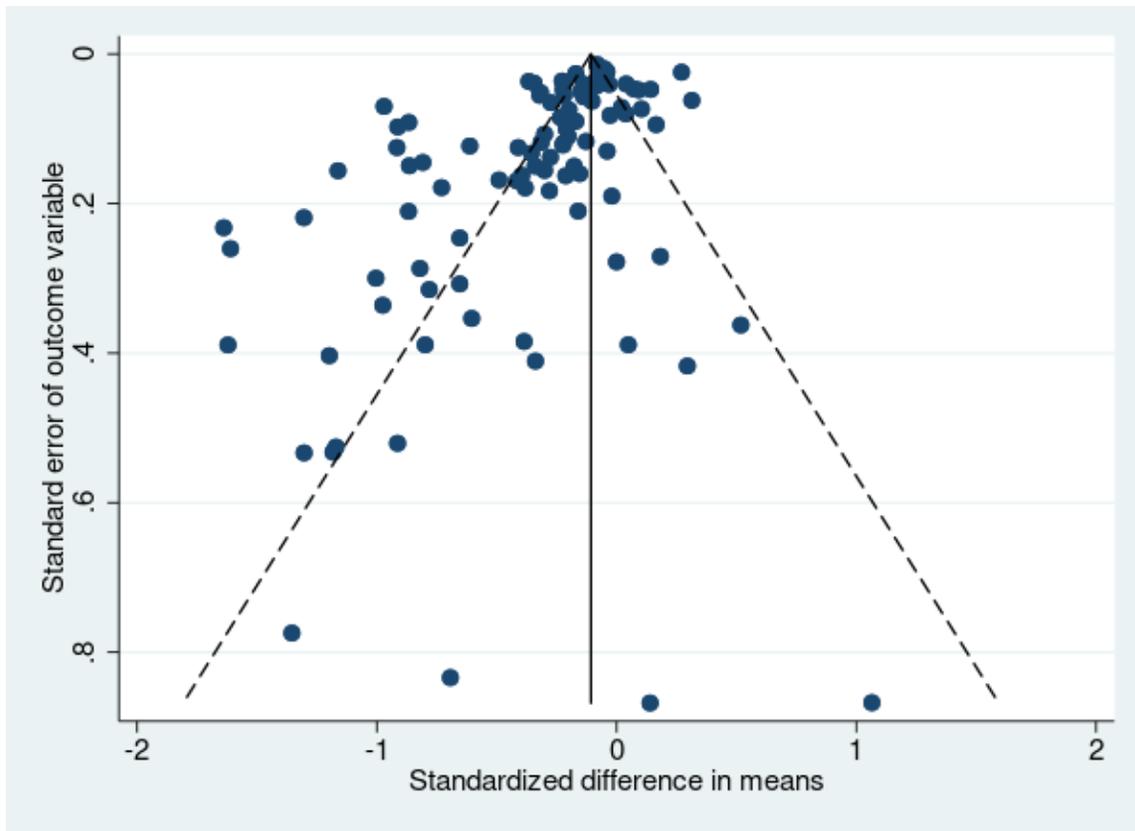


Figure 5: Funnel Plot Robustness Check: Employment

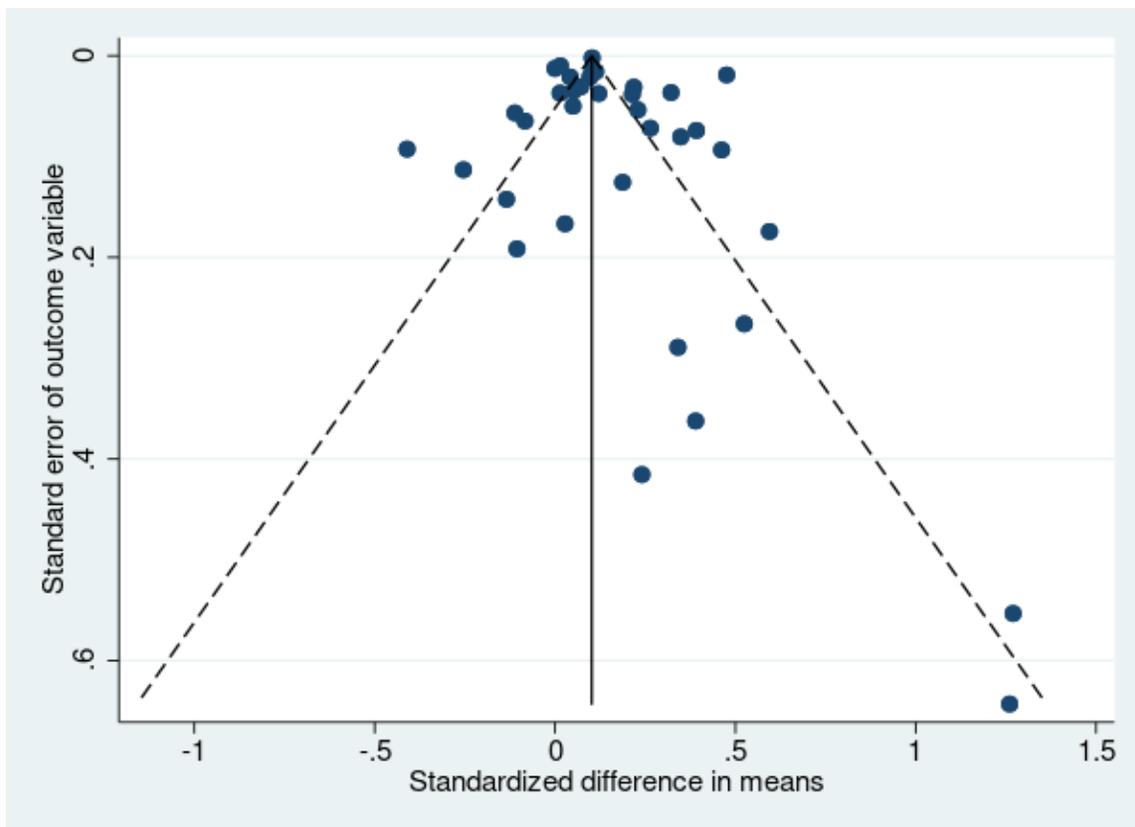
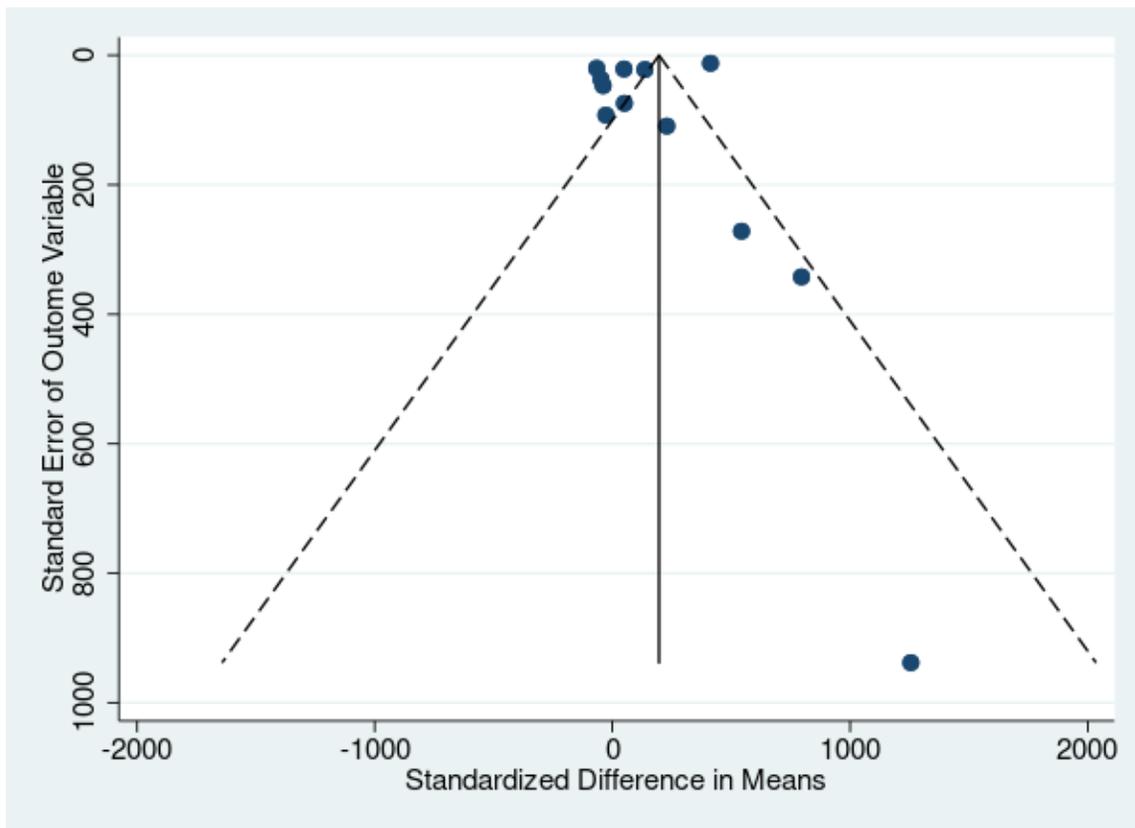


Figure 6: Funnel Plot Robustness Check: Wages



Appendix

1 Appendix

Papers were collected for inclusion using the following method:

STAGE 1: Collecting papers from the existing meta-analysis

While not all papers from the existing meta-analyses will be included in our sample, each paper used in the following analyses was initially eligible for inclusion:

Meta-analyses:

Andrews et al. (1990)

Lipsey and Wilson (1993)

Wilson, Gallagher and Mackenzie (2000)

Aos, Miller and Drake (2006)

Davis et al. (2013)

Bozick et al. (2018)

STAGE 2:

Using a set of search terms and online repositories, a set of search terms was used to identify potential papers for inclusion. Each search will consist of one of the following combination of terms:

1. Academic Term AND Correctional Term
2. Vocational Term AND Correctional Term

Searches were conducted using each of the terms below:

Academic Terms

Education, Academic, School, Diploma, GED, Literacy, Math, Reading, Science, College

Vocational Terms

Job skills, Job training, Apprentice, Apprenticeship, Vocational education, Voc-tech, Occupational education, Career and technical education, Workforce development, Workforce training, Workforce preparation, School-to-work

Correctional Terms

Prison, Jail, Incarceration, Inmate, Detention Center, Corrections

Repositories:

Google Scholar,

Inter-university Consortium for Political and Social Research

education resources information center (eric)

Rutger's Gray Literature Database

Open Access Theses and Dissertations (OATD)

STAGE 3:

We look through the literature reviews of every paper that has already been included, as well as the list of papers that reference each of these papers (found via Google Scholar).

STAGE 4:

Part of the way through this process, we identified two sets of papers that were commonly being missed using the procedures above (and also likely to be missed by previous meta-analyses: thesis papers and state Department of Corrections reports. To find more thesis papers, we added OATD to the list of repositories in Stage 2. To find more department of corrections reports, we used google searches for stings with some variation of "prison education doc + state". For example, "prison education doc utah".

Table A.1: Summary of Papers Included in Meta-analysis

Paper	Treatment	Outcome	SMS Score
Gaither (1980)	Community College	Recidivism	2
Blackburn (1981)	Community College (12 Hours of Participation)	Recidivism (Re-arrest), Various Time Horizons	3
Anderson (1982)	Vocational (Participation)	Recidivism (“returned for parole violation”), Various Time Horizons	2
Marckley, Flynn and Bercaw-Dooen (1983)	Job Placement/Vocational Training	Recidivism	3
Coffey (1983)	Vocational (720 Hours)	Recidivism (2-year, re-arrest), Employment (at 1 year); Weekly Earnings (at 1 year, full sample)	2
Johnson (1984)	Vocational (Participation)	Recidivism (2-year, return to prison), Employment (Weighted by quarters worked)	2
Holloway and Moke (1986)	Associate Degree (Completed vs participated)	Recidivism, return to prison (1-year), Employment (at 1 year)	2
Davis and Chown (1986)	Vocational Training	Recidivism, return to prison (5-year)	2
Dickman (1987)	ABE & GED	Recidivism	2
Hopkins (1988)	Apprenticeship Program	Recidivism (3 Years)	2
Downes, Monaco and Schreiber (1989)	Vocational (Participation)	Recidivism (“several months later”), employment (“several months later”)	3
Schumacker, Anderson and Anderson (1990)	Vocational & Academic (Participation)	Recidivism (criminal activity, 1-year), employment (1-year)	2
O’Neil (1990)	Vocational & Academic (Participation)	Recidivism (undefined)	2
Lattimore, Witte and Baker (1990)	Vocational & Vocational Education (Completion)	Recidivism (about 4 years)	5
Langenbach et al. (1990)	Vocational & Televised College Coursework (Participation)	Recidivism, return to prison (5 years)	4
Lockwood (1991)	College	Recidivism	3
Clarke (1991)	College/masters (Completion vs. withdrawal)	Recidivism, various horizons (Return to prison)	2
Anderson, Schumacker and Anderson (1991)	Academic/Vocational (participation)	Recidivism, various horizons (Return to prison)	2
Division of Program Planning, Research & Evaluation (1992)	GED or College (participation)	Recidivism, return to prison (12-42 months)	2
Adams et al. (1994)	Academic or vocational (participation)	Recidivism, return to prison (12-36 months)	2

Table A.1 Continued

Paper	Treatment	Outcome	SMS Score
Harer (1995)	All Forms of Education (linear variable for participation & completion)	Recidivism, re-arrest or parole (3 years)	4
Piehl (1994)	Various Academic & Vocational	Recidivism	3 (ACA) 2 (VOC)
Fowles and Christensen (1995)	Various Academic & Vocational	Recidivism	2
Kelso (1996)	High School, Vocational, Associates Degree (Completion)	Recidivism	2
Blackhawk Technical College (1996)	Vocational & Literacy	Recidivism & Employment	3
Saylor and Gaes (1997)	Vocational (Participation)	Recidivism & Employment	4
Lanaghan (1998)	GED (Participation)	Recidivism (Re-incarceration, 2 years)	2
Martinez and Eisenberg (2000a)	Academic or vocational (Completion)	Employment (1 year)	2
Martinez and Eisenberg (2000b)	Academic or vocational (participation)	Recidivism	2
Ryan and Desuta (2000)	Vocational (Completed)	Recidivism	3
Hull et al. (2000)	Academic or vocational (participation)	Recidivism (Reincarceration)	2
Burke and Visian (2001)	College (Participation)	Recidivism (Re-incarceration, 5 years)	3
Fine et al. (2001)	College (Participation)	Recidivism (3 years, Re-incarceration)	2
Brewster and Sharp (2002)	Vocational or GED (Completion)	Recidivism (Hazard rate, return to prison)	3
Steurer, Smith and Tracy (2003)	General Education (Participation)	Employment (Any point in 3 years) & Recidivism (3 year, reincarceration)	3
Gordon and Weldon (2003)	GED or vocational (participation)	Recidivism (Revoked parole)	2
Nuttall, Hollmen and Stale (2003)	GED (Completed)	Recidivism (3 years, return to custody)	2
Batiuk et al. (2005)	Secondary Ed. GED, Post-secondary, or vocational (Participation)	Recidivism (Hazard Rate, return to prison)	3
Torre and Fin (2005)	College (Participation)	Recidivism (3 years, return to custody)	2

Table A.1 Continued

Paper	Treatment	Outcome	SMS Score
Smith (2005)	ABE, GED, Vocational (Participation)	Employment (1 year) & Recidivism (1 year, re-incarceration)	3
Tyler and Kling (2006)	GED (Completion vs. participation)	Wages (1 year)	3
Allen (2006)	General Academics & Vocational	Recidivism	2
Visher and Kachnowski (2007)	Job Training (Participation)	Employment (4 to 8 months)	3
Lichtenberger (2007)	Vocational (Completed)	Employment & Recidivism (Various time horizons)	3
Ismailova (2007)	Educational or vocational (participation)	Recidivism (re-arrest or parole revocation within 3 years release)	3
Sabol (2007)	Vocational (Completed)	Employment (2 years)	3
Cho and Tyler (2008)	ABE (Participated)	Employment (1 year) & Wages (Quarterly, first year)	3
Zgoba, Haugebrook and Jenkins (2008)	GED (Completed)	Recidivism (6 years, Number of re-arrests, reconvictions, and reincarcerations)	3
Winterfield et al. (2009)	Post-secondary (participation)	Recidivism (Various definitions)	4
Lichtenberger et al. (2009)	Vocational (Participation)	Recidivism (3 years, reincarceration) & Employment (number of quarters earning above poverty level)	4
Werholtz (2009)	Vocational (Participation)	Recidivism (3 years, return to DOC)	3
Department of Corrections Services (2010)	GED (Completion)	Recidivism (3 years)	2
Visher, Debus-Sherrill and Yahner (2011)	Academic of job training (participation)	Employment (Various horizons)	3
Cronin (2011)	GED (Participation)	Employment (Full time job) & Recidivism (2 years, return to prison)	2
Lichtenberger (2011)	Vocational (Various Levels of Participation)	Recidivism (3 years, reincarceration)	4
Nally et al. (2012)	Various Education (Participation)	Recidivism (3 years, return to custody) & Employment (Various Horizons)	4
Armstrong, Giever and Lee (2012)	Academic, Vocational, or college (participation)	Employment (upon release) & Recidivism (re-incarceration)	2(EMP) 3(RE-CID)

Table A.1 Continued

Paper	Treatment	Outcome	SMS Score
Cho and Tyler (2013)	ABE or vocational (Participation)	Earnings & Employment (1 year, ABE only) & Recidivism (1 year, ABE & voc)	3
Kim and Clark (2013)	College (Completion)	Recidivism (3 years, re-arrest)	4
Duwe and Clark (2014)	GED/HS or college (completion)	Employment, Wages & Recidivism (2 years)	4
Bueche (2014)	Vocational (Participation)	Recidivism	3
Perry (2014)	Academic or Vocational (Participation)	Recidivism (Re-incarceration, 3 years)	3
Armstrong and Atkin-Plunk (2014)	Vocational or Academic (Participation)	Employment (5 quarters) & Recidivism (3 years, re-incarceration)	4(REC) 2(EMP)
Hill and Scaggs (2017)	Vocational (Completed)	Employment (first quarter following release) & Recidivism (3 years, re-imprisoned)	4
Wang (2017)	Academic Vocational (Participation)	Recidivism (3 years, re-incarceration) & employment (1 year)	4(REC) 2(EMP)
Pompoco et al. (2017)	GED, Vocational, or College (Participation)	Recidivism (3 years, return to prison)	4
Visher et al. (2017)	GED or ABE (participation)	Recidivism (56 months)	4
Wang (2018)	Academic & Vocational (Completion)	Recidivism & Employment	4
Long et al. (2019)	ABE, GED, Advanced job training	Recidivism (3 years, Return to prison)	3
Lopez (2020)	Vocational (Participation)	Employment	2
Jensen, Williams and Kane (2020)	GED Attainment	Employment & Wages (Up to 57 months)	4
Denney and Tynes (2021)	College (Participation)	Recidivism	3
Roessger et al. (2021)	GED or Vocational (Completed)	Recidivism & Wages (Quarterly earnings following first quarter)	3
Darolia, Mueser and Cronin (2021)	GED (Completed)	Employment & Wages	4
Wang (2021)	Academic or vocational (participation)	Recidivism (re-incarceration) & Wages (First quarter)	4
La Roi (2022)	Any education (participation)	Recidivism (3 years, Re-incarceration)	2
Smith et al. (2022)	Vocational (Virtual job-training)	Employment (6 months)	5