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Prison rehabilitation programs and recidivism: evidence from variations in availability*

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Abstract

Increasing evidence suggests that incarceration can improve the social reintegration of inmates in some circumstances. Yet, the mechanisms through which incarceration may favor rehabilitation remain largely unknown. This paper exploits variations in program availability in Quebec (Canada) to estimate their effects on recidivism. We find that reintegration programs can substantially decrease the probability of future incarceration. However, this is mitigated by an increase in the probability of future community sentences, though these are associated with less serious offenses. Programs addressing self-development, violent behavior, or education and employment deficiencies exhibit strong effects. Conversely, those focusing on addiction issues and other program types are not found to affect recidivism. These results suggest that specific rehabilitation programs can explain the beneficial effects of incarceration found in the literature.

1 Introduction

Incarceration may impact criminal behavior in several ways. It may prove criminogenic due to greater access to criminal networks and expertise or by lessening an inmate's capacity to reintegrate the labor market due to social stigma or human capital depletion. Yet, recent evidence suggests that lengthy incarceration in prisons that are rehabilitation-oriented may have beneficial effects on recidivism (Landersø, 2015; Bhuller et al., 2020; Lotti, 2022; Hjalmarsson and Lindquist, 2022; Loeffler and Nagin, 2022; Mastrobuoni and Terlizzese, 2022). It is often conjectured that programs that focus on education, on job skills or that provide psychological assistance might be responsible for such effects. In addition to being potentially beneficial to offenders, such programs could turn out to be cost-efficient from society's perspective to the extent they reduce future costly incarceration.

Unfortunately, empirical evidence on relative program efficiency is fairly scant. In their meta-analysis on rehabilitation programs for adult offenders, Wilson et al. (2000) and Davis et al. (2013) both conclude that, while evidence suggests that program participation decreases recidivism and increases employment, the research designs they survey are deemed too poor to provide reliable estimates. The major caveat in most studies is the failure to thoroughly consider selection issues associated with voluntary program participation.

This paper addresses these concerns. We exploit the relative time-varying availability of rehabilitation programs in seven male provincial prisons in Quebec (Canada) to isolate their causal effects on recidivism. Each prison offers an array of programs, ranging from educational and vocational training to addiction and substance use treatments. We find that some programs do substantially decrease future incarcerations, but that this is partly offset by an increase in future community sentences which are nevertheless associated with less serious offenses.

Our study is based on inmates serving sentences of less than two years.[1] This population is particularly relevant for the analysis of rehabilitation programs. Indeed, since prison sentences are relatively short, participants may readily put their newly acquired skills to use. In addition, the offenses for which these men are incarcerated are less serious than those of inmates serving lengthier sentences in federal penitentiaries. They are thus perhaps more likely to successfully reintegrate into society. In this respect, Quebec prisons are mandated by law to offer an array of programs to facilitate social rehabilitation. Prisons managers partner with government bodies,

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[1]In Canada, offenders sentenced to less than two years serve their sentence in a provincial prison, while those with sentences of two years or more are sent to a federal penitentiary.

community organizations and private agencies to develop various programs such as addiction or violence-related interventions, education and job skill courses, or self-development programs.

In our data, the duration of incarceration is negatively correlated with recidivism, suggesting possible beneficial effects of incarceration. The data also show a positive correlation between the duration of incarceration and the number of programs chosen by individual inmates. While these correlations could arise from the causal effect of programs on recidivism, isolating such an effect is challenging due to voluntary participation. Yet, participation is conditional on program availability, which fluctuates exogenously. Indeed, many programs are administered by local school boards and are seldom available during the summer recess and the December break. In addition, fluctuating prison-specific personnel and funding constraints limit the availability and nature of rehabilitation programs. To exploit these features, we construct an instrumental variable that measures the number of programs available to a prisoner while incarcerated in a specific prison. We show that, for a given prison and sentence duration, the instrument is strongly related to participation but not to other individual characteristics, which suggests it is both strong and as good as random.

Our reduced-form results suggest that a one standard deviation increase in the number of available programs decreases the likelihood of reincarceration in a provincial prison by 4 percentage points over a five-year window. However, it also slightly increases the probability of a community sentence by 2 percentage points. Community sentences are used for offenders who have not committed a serious or violent crime, or a crime that do not carry a minimum sentence. This shift from incarceration to community-based sentences is consistent with participants committing less serious offenses and suggest that programs may help alleviate prison overcrowding and high incarceration costs, as community sentences are less costly.[2] We also find precise but not statistically significant program effects on reoffenses that lead to federal sentences. Instrumenting participation with program availability, we find that each additional program take-up decreases the probability of reincarceration by as much as 7 percentage points over five years. Our results are robust to the inclusion of additional control variables, to alternative recidivism definitions, to variations in the instrument as well as to other specifications.

Finally, we find that programs that focus on self-development, violent behavior, education deficiencies or employment unreadiness all significantly decrease the likelihood of recidivism. On

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[2]In Canada, in 2018, the average cost/inmate was \$115,000/year, while a community-based sentence carried a cost of only \$18,000/year (Parliamentary Budget Officer, 2018).

the other hand, addiction programs, as well as program related to arts, spirituality and sports yield precise null effects. While our results suggest that those serving longer sentences are most impacted by the number of program made available, inmates who serve shorter sentences experience modest yet significant effects.

Contributions to the Literature

The contributions of the paper are twofold. First, it contributes to the broad literature investigating the link between incarceration and post-release outcomes. Some find that lengthy prison sentences may deplete human capital and alter an inmate's capacity to reintegrate into the labor market (Lochner, 2004; Aizer and Doyle Jr, 2015; Mueller-Smith, 2015). Others argue that prison spells might act as a *school of crime* in which networks of criminals share knowledge and influence one another (Bayer et al., 2009; Stevenson, 2017). Conversely, incarceration may decrease crime through incapacitation and deterrence.[3] Furthermore, recent papers have shown that incarceration in rehabilitation-friendly prisons can be beneficial. Landersø (2015) studies a reform in Denmark that lengthened sentences for violent offenders and shows that the reform increased employment and earnings. Bhuller et al. (2020) use a judge leniency design and provide causal evidence that inmates who serve longer sentences in Norway are less prone to reoffend. This effect is driven by previously unemployed offenders who are likely to gain from job training programs. In the United States, the literature yields mixed results. Rose and Shem-Tov (2021) exploit discontinuities in North Carolina's sentencing guidelines and find that incarceration length decreases reoffending. Using a leniency design, Norris et al. (2021) also find a reduction in reoffenses following an incarceration spell. However, other papers based on leniency designs in the United States find no causal effects of incarceration on economic outcomes (Kling, 2006) or recidivism (Green and Winik, 2010). Whether these mixed results are (partly) driven by relative availability of rehabilitation programs is an empirical question.

A related literature compares punitive prisons to rehabilitation-oriented ones, with a particular focus on differences in prison conditions. Such conditions, which may include the composition of peers, occupancy rate, employees-inmates ratios, and prison activities have been suggested to affect recidivism (Chen and Shapiro, 2007; Drago et al., 2011; van Ginneken and Palmen,

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[3]See Owens (2009); Buonanno and Raphael (2013) and Barbarino and Mastrobuoni (2014) for recent evidence documenting the importance of incapacitation effects of incarceration. See Chen and Shapiro (2007) for a review of empirical evidence of the deterrence effects of incarceration, and Mastrobuoni and Rivers (2016) for more recent evidence.

2022; Yu et al., 2022). One prominent example is Lotti (2022), who exploits a major reform in England and Whales which marked a shift from strict warehousing to rehabilitating of young offenders. The reform is found to have decreased recidivism substantially. Mastrobuoni and Terlizzese (2022) compare (harsh) *closed* to (rehabilitation-oriented) *open* prison regimes on recidivism in Italy using variations in nearby prisons' overcrowding and find that open prisons yield lower recidivism. Tobón (2020) shows that exogenous assignment of inmates from older to newer Colombian prisons—which are less crowded and offer better living conditions, services, and rehabilitation programs—substantially reduce recidivism. Finally, Hjalmarsson and Lindquist (2022) study the effects of Swedish reforms that lengthened incarceration. They show that time spent in prison allows inmates with mental health issues to engage in therapy and to participate in various programs, resulting in long-lasting health benefits and reduced recidivism. These studies provide indirect evidence that rehabilitation programs are perhaps responsible for the observed link between incarceration and post-release outcomes. Our paper complements this literature by estimating the effect of several prison-based interventions and by providing evidence that they are indeed a driving force underlying rehabilitation.

The second contribution of the paper is to add to the growing literature that evaluates different types of programs aimed at offenders at varying stages of their criminal trajectory. An important strand of the literature focuses on programs aimed at young offenders. Heller et al. (2017) provide evidence that behavioral interventions may reduce recidivism among this population. They exploit three RCTs located in Chicago that focused on at-risk youths and juvenile delinquents and find that participation in tailored programs significantly reduced rearrests and readmissions. Seroczynski et al. (2016) also study similar programs through a RCT design and find it decreases recidivism significantly whereas Armstrong (2003) find no such effect.

Studies on programs targeted at adult offenders can be separated into two groups: prison-based and external. Doleac et al. (2020) review three randomized controlled trials of external reentry programs and find, at best, mixed evidence of their effectiveness.[4] Blattman et al. (2017) study the effect of behavioral therapy and show that it can reduce violent crimes. Many studies have sought to estimate the effects of prison-based programs, but as mentioned earlier, this liter-

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[4]Other studies find mixed results. For instance, Cook et al. (2015) conduct a RCT on high-risk offenders in Wisconsin. They find a decrease in the likelihood of a rearrest but no difference in the likelihood of reincarceration.

ature faces challenges due to selection issues.[5] However, recent studies have found encouraging results. Balafoutas et al. (2020) randomly asked inmates to reflect on their incarceration and show that this simple intervention increased the inmates' social aptitudes. Studying the same setting as the current paper, Arbour (2022) focuses on a behavioral intervention targeted specifically at high-risk offenders, and finds large reductions in reoffenses in the short run. Kuziemko (2013) exploits a 1998 policy reform which canceled parole eligibility for convicts in the state of Georgia. She presents evidence that inmates respond by decreasing their rehabilitation effort, including reduced program participation while incarcerated, thereby increasing the likelihood of reoffending. Macdonald (2023) exploits a reform in Arizona which eliminated judges' discretion over early release. He conjectures that the ensuing increase in recidivism is most likely due to reduced rehabilitation efforts while incarcerated. All in all, scarce empirical evidence suggests that inmates may benefit from rehabilitation programs. Our paper contributes to this literature by focusing explicitly on prison-based interventions and by highlighting the types of programs that are most beneficial.

The remainder of the paper is structured as follows. Section 2 discusses the setting, the data, and the various definitions of recidivism used in the analysis. In Section 3, we present summary statistics and elaborate on the associations between incarceration time, program participation and availability, and recidivism. Section 4 presents the results along with robustness checks and heterogeneity analyses. We conclude in Section 5.

2 Institutional Details and Data

2.1 Institutional details

In Canada, a person charged with a criminal offense may be released while awaiting trial or, depending on the seriousness of the charge or whether it involves violence, be incarcerated until trial (known as "pre-trial" detention). If found guilty, the judge determines the type (custodial vs community) and the duration of the sentence. If the sentence is less than two years, it will be served either in a provincial correctional centre ("prison") or in the community. Sentences of at least two years lead to incarceration in a federal penitentiary. The prison where offenders

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[5]In her literature review, Doleac (2021) notes that "future work exploiting natural experiments or field experiments that avoid selection bias would be valuable for determining the power of educational programs—alone or in combination with other [prison-based] interventions—to encourage desistance from crime." Davis et al. (2013) and Visher et al. (2005) recognize the same gap in the literature.

serve their sentence is not random. The judge may select a specific one based on the nature of the crime, the criminogenic needs of the offender, and the availability of appropriate services and programs.

Community sentences do not apply to crimes that carry a mandatory minimum sentence. They are typically less costly than incarceration and offer offenders the opportunity to work or attend school.[6] In contrast, incarceration often results in the loss of employment and other opportunities which may undermine reintegration upon release. Though provincial incarceration is deemed harsher than community sentences, federal sentences are considered yet harsher.

Our analysis focuses on convicts sentenced to less than two years, with an average sentence of four months. In practice, most will serve only two-thirds of their original sentence.[7] We refer to the date corresponding to two-thirds of the sentence as the *planned* date of release. Prisoners may be released sooner if granted parole, in which case they may be offered other forms of rehabilitation assistance.[8]

To facilitate their social reintegration, all provincial prisons offer inmates a diversified set of programs. Prisons managers partner with government bodies, such as the Ministry of Education and the Ministry of Labour, to offer programs tailored to the local labor market. Community organizations and private agencies can also be called upon to develop specific programs such as addiction interventions and anger management workshops. Participation in such programs is voluntary and may not mandated by the sentencing judge. However, the judge may request incarceration to the prison deemed best suited to the offender's criminogenic needs. Once incarcerated, and following an in-depth assessment (see below), inmates may be encouraged to enroll in specific programs. Ultimately, prisoners decide whether to participate or not and may enroll in as many programs as available.

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[6]As mentioned previously, in Quebec, in 2018, the average inmate daily cost is \$254 (Statistics Canada, 2022). The daily cost of probation is \$49 (Parliamentary Budget Officer, 2018).

[7]In order to incentivize good behavior, time may be credited towards release upon serving two-thirds of a sentence.

[8]Arbour and Marchand (2023) study the effect of parole among this population and find it can yield rehabilitative effects. Parolees represents less than 9% of our sample. They only serve one-third of their sentence unless reincarcerated due to a breach of conditions. Fewer than 40% of convicts are eligible for a hearing, of whom only 22% are granted parole.

Prisons have a legal obligation to provide rehabilitation programs.[9] However, the law does not provide any guidelines as to the number of programs that must be offered nor as to their content and duration. In practice, these are determined at the prison level. The majority of the programs are structured to incorporate one to two-hour sessions on a weekly basis, typically spanning five to six weeks. Job skills programs are more intensive. For instance, in order to obtain a permit to work on a construction site, an inmate must undergo a minimum of 30 hours of instruction over the course of a week. Meanwhile, participants enrolled in high school studies dedicate an average of 20 to 25 hours per week to attend classes. Finally, the availability is also prison-specific as it depends on several factors such as financial and staffing resources.

The reintegration of prisoners is not limited to rehabilitation programs. Rehabilitation-oriented prisons may also offer healthcare services, counseling and family support in addition to standard programs. Furthermore, at the onset of their incarceration, inmates' physical and mental conditions are assessed by a qualified professional. Those serving a sentence less than six months will be briefly assessed by a correctional officer. Those serving a longer sentence will be thoroughly assessed and evaluated using the comprehensive standardized risk assessment tool known as the "Level of Service/Case Management Inventory" (LS/CMI, afterward).[10] Contrary to other jurisdictions, the evaluation in Quebec occurs after sentencing and is thus not used in sentencing. The evaluation is meant to provide risk scores and to identify rehabilitative needs.

2.2 Data

The data used in this paper are drawn from the Administrative Correctional Files (DACOR) of the Province of Quebec Ministry of Public Security.[11] DACOR contains detailed information on all daily convicts incarcerated in all provincial prisons. In addition to judicial information,

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[9]Article 21 of the Act Respecting the Québec Correctional System (2023) states "The Minister shall develop and offer programs and services to encourage offenders to develop an awareness of the consequences of their behaviour and initiate a personal process focusing on developing their sense of responsibility." Article 22 reads: "The Minister shall see to it that the offenders' access to specialized programs and services offered by community-based resources to foster their reintegration into the community and support their rehabilitation is facilitated. Such programs and services are designed to initiate the process of solving the problems associated with the delinquency of the offenders, in particular problems of domestic violence, sexual deviance, pedophilia, alcoholism and substance abuse."

[10]The LS/CMI is a widely implemented proprietary assessment tool in North America (Andrews et al., 2000) and is the culmination of ulterior versions of tools within the "Level of Supervision Inventory" family. Officers must complete the evaluation seven days at the latest before the sixth of the sentence or within 45 days after sentencing, whichever comes first. If an inmate is reincarcerated, a new evaluation is not deemed necessary if a prior evaluation is still considered appropriate and was completed less than two years prior. Only trained officers can conduct the assessment. See Vose et al. (2008) for a review of the LS/CMI.

[11]In French: Dossiers Administratifs CORrectionnels.

DACOR documents the type of crime as well as individual characteristics such as age, number of dependents, and Indigenous status. At first offense, convicts are assigned a unique identifier which is used to generate a historical record of their interactions with the judicial system.

For each sentence, DACOR records the start and end dates of the sentence, and a code for the most serious charge associated with a given crime.[12] Pre-trial detention is also reported and matched to individual records. Importantly, even though our paper focuses on releases from provincial prisons, all future reoffenses are recorded in the correctional files irrespective of whether they are served in the community, in a provincial prison or in a federal penitentiary.

DACOR also includes all individual LS/CMI assessments for offenders serving for at least six months. The data contain the evaluation of all 43 items of the assessment tool which are aggregated into eight risk scores. The tool documents risk factors related to (1) criminal history, (2) consumption of alcohol and drugs, (3) educational attainment, (4) lack of adequate leisure, (5) family issues, (6) social relationships issues, (7) anti-social patterns, and (8) pro-criminal attitudes. These risk scores are highly informative proxies for the propensity to recidivate.[13]

As mentioned above, rehabilitation programs are prison-specific and managed locally. We obtained detailed *program enrollment* files from seven prisons over different time frames. These were merged to the DACOR files using individual identifiers.[14] The files comprise as many as 145 different programs. These were aggregated into six categories following advice from several program managers: self-development, violence, addiction, education, job skills, and *other*, which comprises leisure, spirituality and sports activities. The stratification was based on the criminogenic risks and needs targeted by each. Thus, we observe the list of all program enrollments for each prisoner. However, we do not observe the duration of programs in the data.

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[12]In practice, offenders can be sentenced for each charge. Our data only contain the sentence for the most serious charge for which the offender was found guilty.

[13]All risk scores are highly predictive of recidivism in our sample. See our previous version of this paper for a detailed analysis (Arbour et al., 2021).

[14]Twenty-two prisons were active over our sample window. Eighteen are still active as of this writing: some were closed and others were merged into new and more modern establishments. Among the seven prisons for which we have program participation files, six are among the eight largest in terms of caseloads. The other two are relatively small establishments.

2.3 Measuring Recidivism

The definition of recidivism differs in the literature and across jurisdictions.[15] In this paper, we consider various definitions of recidivism, all based on sentencing for a new crime occurring after the *planned* date of release. These are:

- A new provincial incarceration
- A new federal incarceration
- A community sentence
- Any of the above.

As we show in our robustness analysis, our results are virtually unchanged if the follow-up period starts at the actual rather than the planned release date.[16] Our results are also robust to using the beginning of the sentence as a starting date for computing recidivism. We vary the follow-up period from one to five years, discarding censored observations in each case.

3 Descriptive Statistics

Table 1 reports the average and standard deviation of all explanatory variables for program participants and non-participants separately. The types of crime are aggregated into four categories: assault, burglary and theft, drug-related, and *other*.[17] Reported crimes are those deemed most serious for a given sentence and are thus mutually exclusive. Participants are more likely to be charged for assault or burglary and theft, but less likely for drug-related or *other*. Indigenous convicts represent 6.6% of the the sample but as much as 9.4% of all participants. This is perhaps due to the fact some prisons have designed specific programs for this population. Interestingly, participation does not vary much across age groups.

The average number of incarceration days is greater for participants both during pre-trial and post-trial detention. The relationship between participation and post-trial incarceration is

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[15]For instance, Kuziemko (2013) defines recidivism as any reincarceration occurring within three years. In contrast, Bhuller et al. (2020) define recidivism as the event of being charged with at least one crime during a given period. The Quebec Ministry of Public Security as well as Public Safety Canada both consider as recidivism any new sentence for a different offense occurring within two years following to end of the previous sentence. Alternatively, the United States National Institute of Justice defines recidivism as any subsequent involvement with the criminal justice system within three years following release, whether or not a new sentence was issued.

[16]This is not surprising given that the majority of inmates are released near the planned date. Recall that fewer than 9% of individuals in our sample are granted parole. See footnote 8 for further details.

[17]The *other* category comprises crimes such as fraud, traffic-related offenses, prostitution-related crimes, illegal weapons, and others.

intuitive: prisoners with longer sentences have more opportunities to enroll (see below). The relationship between pre-trial detention and participation in less intuitive given that convicts do not typically enroll during pre-trial detention.[18] However, according to Bourgon and Grech (2011), this correlation can be explained by the fact that more serious crimes tend to entail lengthy and complex legal procedures, and as such may postpone the trial date.

The "LS/CMI: Evaluation" variable indicates whether an inmate was evaluated with the LS/CMI assessment tool. Participants are more likely to be evaluated than non-participants (69.5% versus 37.7%). This is not surprising since participants have longer post-trial sentences and given that the evaluation is conducted only if the sentence is greater than six months. The next set of rows report the average of the total LS/CMI score as well as those of its eight components.[19] Most LS/CMI scores are smaller among participants. While some differences are statistically significant, they are nevertheless small relative to their the standard deviations.

The intensity of participation varies considerably among participants. Figure 1 depicts the distribution of program enrollment per participant. Approximately 44% of them enroll in a single program while around 19% (11%) enroll in two (three) programs. It is not uncommon to observe yet more program enrollment per prison spell. Table 2 reports participation statistics broken down by program category. Column (a) focuses on the unconditional participation rates per program while column (b) reports the conditional distribution of program enrollment. Roughly 19% of convicts participate in one program, the most common being education, self-development and addiction programs. Over the course of their stay in prison, participants enroll in three different programs on average.

Figure 2 plots the rates of recidivism by participation status defined over one to five-year intervals after the planned date of release. The figure distinguishes between reoffenses that lead to a community, a prison (provincial) or a penitentiary (federal) sentence. Overall, program participants have lower rates of recidivism save for federal sentences, which rarely occur in our data (bottom-left panel). Interestingly, the differences between the two groups are stable across intervals with respect to provincial incarceration but taper off with respect to community sentences. The bottom-right panel shows the rates of recidivism that lead to any sentence.[20]

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[18]From extensive discussions with prison personnel, one reason inmates seldom enroll in any program during pre-trial is the fear it may be interpreted as an admission of guilt.

[19]Note that the comparisons are conditional on being evaluated. Hence the smaller number of observations.

[20]These rates do not correspond to the sum of the three others, as one can recidivate multiple times and obtain different sentence types. For example, a person who is released from a provincial prison might receive a brief community sentence and commit another offense while serving that sentence, resulting in a subsequent prison sentence.

Figure 3 plots the relationship between incarceration length and recidivism one and five years after planned release. We observe a negative correlation between the two. As mentioned above, prisoners with longer sentences have more opportunities to enroll. We investigate this in Figure 4 which plots the average number of program enrollment as a (positive) function of incarceration length. Taken together, Figures 3 and 4 underline the complex relationship between incarceration length, program participation and recidivism: lengthy incarcerations are associated with lower recidivism and greater program participation. Participation in programs, in turn, is associated with lower recidivism. Identifying the causal link between program participation and recidivism requires a particular design to net out the contribution of sentence duration.

Lengthy sentences will naturally tend to provide greater opportunities to enroll. What is more, financial resources and labor constraints vary across prisons and time so that not all convicts may face the same opportunities. To see this, we computed the number of programs a prisoner could potentially enroll in conditional on the duration of incarceration during his sentence. Figure 5 draws a scatter plot of the number of such programs with respect to duration separately for each prison in our data. As shown, program availability varies significantly across prisons. For example, a prisoner serving a 100-day sentence could in some cases have access to fewer than five different programs. In other cases, as many as 10 to 20 programs could have been offered for a similar sentence duration.

Importantly, the prison in which a prisoner is incarcerated is not random, nor is his sentence duration. Thus, the across-prison variations in program availability and those that arise from variations in sentence duration cannot be used to isolate the effects of programs. Yet, a series of other factors may exogenously affect programs availability. One source of such variation is the timing of the incarceration. Indeed, fewer programs are usually available during the summer recess and the holiday season as shown in Figure 6. Thus a convict who must serve a sentence which overlaps the months of June-July or November-December will very likely be offered fewer opportunities. In what follows, we construct an instrument that captures such exogenous variations in program availability.

4 Estimation and Results

4.1 Research Design

Program participation is endogenous. To estimate the causal impact of participation on recidivism, we use the availability of programs as an instrumental variable. More precisely, our instrument corresponds to the number of available programs over the entire course of one's incarceration. The instrument is constructed from the *Program Enrollment* files which contain the registration date, the specific program and the personal identifier of all enrollees. Figure 7 illustrates this. Assume a timeline such that we observe three enrollees in program A (red dots), three in program B (blue dots), four in program C (yellows dots), and four in program D (green dots). Given the timing and the duration of their incarceration, *Prisoner 1* can only enroll in programs B and C, and *Prisoner 2*, in programs C and D. In this example, the instrumental variable is equal to two for both of them. With this logic, we compute our instrument z_{ip} as the number of programs in prison p for which we observed any enrollment, from the beginning of the sentence of individual i to the release date. We test the robustness of our results to this definition in section 4.4.

We begin with a series of reduced-form regressions to measure the intent-to-treat effects of program availability on recidivism. Consider inmate i who is incarcerated in prison p and sentenced during year t. We use the following specification:

$$y_{ipt} = \beta z_{ip} + \underbrace{\alpha_t + \alpha_p + \gamma_p s_i}_{\text{randomization controls}} + X_i'\eta + \epsilon_{ipt}, \tag{1}$$

where y_{ipt} is a measure of recidivism, z_{ip} is the instrument, and s_i is the duration of incarceration during the sentence. In all specifications, we include prison fixed effects (α_p) and year of sentence fixed effects (α_t). Additionally, we include prison-specific length of stay effects (γ_p). We refer to these controls (α_t, α_p and $\gamma_p s_i$) as the set of *randomization controls*. We include these for the following reasons. First, some prisons tend to offer more programs. However, as mentioned previously, prison allocation is not random and will often be based on the offender's characteristics. This explains our choice to use prison fixed effects and exploit within-prison variations in the instrument. Second, as shown in Figure 5, prisoners serving lengthier sentences are mechanically exposed to more programs at a rate that is prison-specific. As sentence duration is not random, our estimation must not exploit variations in z_{ip} arising from s_i. Conditioning

on prison-specific length of stay effects ($\gamma_p s_i$) is thus crucial in ruling out that our instrument captures such variations. Finally, the year of sentence fixed effects α_t ensure that the remaining variations in our instrument arise from timely fluctuations rather than longer-term time trends. By conditioning on this set, the instrument leverages the within-prison vertical (i.e., conditional on sentence duration) variations in program availability that are visible in Figure 5.

All regressions include a vector of individual characteristics, X_i', that includes up to all the variables listed in Table 1. We cluster the standard errors at the prisoner level since some experience multiple spells—we verify the robustness of our findings when clustering at the prison-year level as well.[21] We also test the robustness of our results to a specification that includes only the first incarceration spell observable for each individual. The distribution of z_{ip} is standardized to have a standard deviation of one. Therefore, β must be interpreted as the marginal effect of increasing program availability by one standard deviation on recidivism ($\sigma_z = 11$ in our sample).

We next estimate a series of 2SLS regressions. In these specifications, the number of programs in which inmate i participates, n_{itp}, is instrumented using z_{ip}. The first and second-stage regressions are given by:

$$n_{itp} = \nu z_{ip} + \alpha_{1t} + \alpha_{1p} + \gamma_{1p} s_i + X_i' \eta_1 + \epsilon_{ipt} \tag{2}$$

$$y_{itp} = \theta n_{itp} + \alpha_{2t} + \alpha_{2p} + \gamma_{2p} s_i + X_i' \eta_2 + \upsilon_{ipt}. \tag{3}$$

4.2 Validity of the instrument

Table 3 reports estimation results of the first-stage regression—equation (2). Column (1) only includes the *randomization controls*. Column (2) adds the additional control variables, X_i. Column (3) is the same as column (2) except that it focuses on individuals that are observed up to five years upon release. In all three specifications we find that the instrument is strongly correlated with program enrollment, as demonstrated by the high and significant F statistics.

Table 4 next investigates the link between individual characteristics and program enrollment (n_{itp}), on the one hand, and individual characteristics and program availability (z_{ip}) on the other hand. As reported, some explanatory variables have an impact on the number of programs enrolled in during a prison spell. Drug-related crimes and assault are found to have

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[21]More precisely, 75% of individuals appear only once, 15% appear twice, and 10% appear three times or more.

a positive impact while Indigenous convicts enroll in fewer programs than the non-Indigenous. In addition, inmates spending more time in pre-trial detention tend to participate in more programs. However, column (2) shows that program availability (the instrument) is unrelated to individual characteristics save for drug-related crimes and to Indigenous status. Nevertheless, the resulting F-statistic is as little as to 1.59 and not statistically significant, which indicates that the variations in program availability that we exploit for identification are unrelated to individual characteristics.

4.3   Main results

We investigate the link between program take-up and four different types of recidivism: i) incarceration in a provincial facility, ii) community sentences, iii) federal sentences , and iv) all sentences. Moreover, we examine the occurrence of recidivism within different time frames, ranging from one year to five years after planned release. In the robustness analysis below, we further consider alternative start dates for measuring recidivism, including the onset of the sentence and the date of actual release.

Table 5 presents the results. Panel A focuses on reincarceration in provincial prisons. The OLS estimates show an negative association between recidivism and the number of programs taken up during a spell, with each program being associated with a decrease in reincarceration of 0.7 percentage points within three years. The results are also suggestive of a negative causal relationship: the reduced-form estimates indicate that a one standard deviation increase in program availability reduces the likelihood of reincarceration by about 4 percentage points within the first three years, which translates into a decrease of 12% relative to the mean. The 2SLS estimates show a statistically significant negative effect but of greater magnitude than the OLS estimates. Specifically, for each additional program participation, the probability of recidivism decreases by about 6 percentage points on average, a decrease of 19% per program.

The previous beneficial effects of program participation do not carry over to reoffenses that lead to community sentences. According to Panel B, while the OLS estimates are all negative, the reduced-form and 2SLS estimators yield opposite results. Thus a one standard deviation increase in program availability is found to increase the likelihood of future community sentences by 1–3 percentage points, or about 8% relative to the mean. The 2SLS yields estimates of similar magnitude. It might be conjectured that the rehabilitative programs induce participants to commit less serious offenses once released from prison.

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Recall from Figure 2 that federal reincarcerations are very few and that they are usually associated with serious offenses. Panel C focuses on these. Although all point estimates suggest that program availability and that participation decrease the likelihood of reoffending, all are close to zero and not statistically significant. The reduced-form estimator yield precise null effects. For example, a 95% confidence interval of the marginal effect of one standard deviation increase in program availability over a three-year period ranges from -0.8 to 0.3 percentage points. Finally, we consider all sentences in Panel D. Program availability and participation are found to have no effect on recidivism. This is not surprising since the estimates are a weighted average of those in Panels A, B and C.[22]

Taken together, the estimates of Table 5 unearth interesting program effects. Globally, reintegration programs are found to impact reoffenses very little. Yet, they do impact prison reincarceration negatively and community sentences positively. This is likely beneficial from society's perspective because community sentences are much less costly and are typically given for less serious offenses compared to those that resulted in the initial imprisonment. It is also worth noting that the positive impact of reintegration programs on reducing prison reincarceration can lead to significant reductions in prison overcrowding.

4.4   Robustness

The Appendix reports a series of robustness tests. These include omitting the control variables from the regression (Table A.2) or alternatively including the eight additional LS/CMI risk scores and focussing on the subset of evaluated offenders (Table A.3). We also compute prison-year clustered standard errors (Table A.4) and limit the sample to the first occurrence of each individual (Table A.5). The results are robust to all these alternative specifications.

Our instrument exploits prison-specific time variations in program availability. Although we control for year fixed effects, there remains the possibility that inmates who are incarcerated at different times during the same year might differ in their unobserved characteristics. To control for such potential seasonal effects, we also included month fixed effects corresponding to the first month of incarceration (Table A.6). Further, our original instrument measures the number

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[22]We further investigate the effects of program availability on recidivism at the intensive margin. That is, we estimate the effect of one additional program conditional on participating in at least one program. Our results are reported in Table A.1 of the Appendix and are consistent with the main results: each additional program reduces the likelihood of reincarceration and increase that of community sentencing slightly, although the latter is not statistically robust to post-release intervals.

of available programs during the entire incarceration spell. One might be concerned about the release date being endogenous. We thus construct an alternative instrument that counts the number of available programs up to the planned relase date (Table A.7). Once again, the estimates are robust to these specifications.

In our primary regressions, recidivism outcomes were measured starting at two-thirds of the individual sentences, i.e., the planned date of release. We investigate the consequences of measuring recidivism starting at the beginning of the sentence or at the actual release date in Tables A.8 and A.9. The results remain unchanged regardless of the start time we use.

4.5   Heterogeneity

Our baseline estimates use the number of available programs of any type as an instrumental variable. To estimate the effects of each specific program category (self-development, education, violence, job skills, addiction, and *other*), we construct an instrument for each. We then estimate the reduced-form model—equation (1)—separately for each category using the appropriate normalized z_{ip}. We control for prisoner characteristics and fixed effects in the same manner as in our main specification.

For the sake of brevity, we focus on recidivism leading to a provincial incarceration, as our main results showed the strongest and most statistically significant effects of programs for this outcome.[23] Figure 8 displays the estimated effects of the different program types on the probability of being reincarcerated. As shown, most programs decrease reincarceration irrespective of the time frame. Furthermore, programs that address violence issues yield marginally larger effects compared to other program types. On the other hand, programs that focus on addiction and those in the *other* category have precise null effects on recidivism.

The program effects potentially differ across inmates. Knowing who benefits most is essential for optimal resource allocation. For instance, programs may affect those serving short and long sentences differently. This information can then be used to tailor programs to individual needs and to maximize their impact.

We implement our baseline approach by estimating reduced-form regressions based on the total number of available programs and divide the sample into three equal-sized groups according to sentence length. In order to account for the fact that those with longer sentences have

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[23]We find no heterogeneous effects when considering the other outcomes. The entire set of results is available upon request.

more opportunities to train, we standardize the instrument according to the number of months spent in prison.[24] The instrument thus measures the marginal effect of increasing the number of available programs *per month* on reincarceration. Figure 9 depicts the parameter estimates. Program availability benefits all inmates irrespective of sentence length, though those serving longer sentences benefit most. Specifically, increasing monthly program availability by one reduces the likelihood of reincarceration by 0.25 percentage point for those serving short sentences (7-33 days) and by as much as 1 percentage point for those serving long sentences (112 days +).

Finally, Figure A.1 in the Appendix reports reduced-form estimates of the baseline specification stratified according to several characteristics. Interestingly, there does not appear to be any particular heterogeneous response to program availability among the groups we consider: the dynamic pattern is the same for each age group (below or above the median age of 35), each crime category and each LS/CMI risk group (below or above the median risk score of 27).

5 Conclusion

Recent evidence suggests that lengthy incarceration may favor rehabilitation (Landersø, 2015; Bhuller et al., 2020; Hjalmarsson and Lindquist, 2022) and that prison conditions play an important role (Lotti, 2022; Mastrobuoni and Terlizzese, 2022; Tobón, 2020). Many have argued that rehabilitation programs may drive these effects. Our paper supports their claim. Using rich data from provincial prisons in Quebec, Canada, we investigate different forms of recidivism (community sentence, provincial prison, federal penitentiary) each defined over several time windows ranging from one to five years. We address selection issues using an instrumental variable defined as prison-wide program availability while incarcerated. We find that the availability of rehabilitation programs addressing self-development, violent behavior, or education and employment deficiencies can substantially decrease reincarceration. These findings are robust to several tests. Interestingly, we find no evidence of heterogeneous response to program availability by age group, type of crime, or (LS/CMI) risk profile.

Our results unearth an interesting feature of recidivism that is seldom investigated in the literature. While rehabilitation programs reduce the risk of reincarceration, they also increase the likelihood of future community sentences. We conjecture that rehabilitative programs may induce participants to commit less serious offenses once released from prison. On the whole,

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[24]More precisely, we divide the instrument by the number of days of incarceration multiplied by 30.

prison-based programs are likely socially beneficial since community sentences are much less costly, are resorted to for less serious offenses and can help alleviate the burden on the criminal justice system.

In this paper, the efficiency of rehabilitation programs is strictly gauged against future reoffenses. Investigating their long-term impacts on employment, housing, welfare dependency or health is a worthwhile research avenue. Inducing convicts to serve community rather than incarceration sentences may yield additional benefits by helping them maintain connections with their families, support networks and employers.

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Table 1: Summary Statistics for Participants and Non-Participants

| | Non-Participants | | | Participants | | | Diff. |
| | Mean | SD | Obs. | Mean | SD | Obs. | p-value |
	(a)	(b)	(c)	(d)	(e)	(f)	(g)
Crime: Other	0.377		23514	0.225		5393	0.000
Crime: Assault	0.180		23514	0.201		5393	0.000
Crime: Burglary and theft	0.216		23514	0.293		5393	0.000
Crime: Drugs	0.227		23514	0.281		5393	0.000
Indigenous	0.060		23514	0.094		5393	0.000
Age < 26	0.247		23514	0.252		5393	0.470
27 ≥ Age < 34	0.228		23514	0.238		5393	0.120
35 ≥ Age < 45	0.268		23514	0.282		5393	0.039
Age ≥ 46	0.257		23514	0.228		5393	0.000
At least one dependent	0.022		23514	0.028		5393	0.006
Pretrial detention (days)	28.435	70.389	23514	60.114	106.804	5393	0.000
Posttrial detention (days)	79.928	88.660	23514	191.862	115.271	5393	0.000
LS/CMI evaluation	0.377		23514	0.695		5393	0.000
LS/CMI: Total Score (0 to 43)	26.071	8.088	8869	25.604	7.645	3748	0.003
LS/CMI: Crim. History (0 to 8)	5.951	1.844	8869	5.998	1.765	3748	0.185
LS/CMI: Educ./Empl. (0 to 9)	5.633	2.673	8869	5.598	2.576	3748	0.491
LS/CMI: Family/Marital (0 to 4)	2.031	1.148	8869	1.946	1.134	3748	0.000
LS/CMI: Procrim. Attitude (0 to 4)	1.804	1.328	8869	1.709	1.277	3748	0.000
LS/CMI: Companions (0 to 4)	2.719	1.023	8869	2.719	0.972	3748	0.970
LS/CMI: Leisure/Recreation (0 to 2)	1.619	0.608	8869	1.590	0.618	3748	0.015
LS/CMI: Alcohol/Drug (0 to 8)	4.257	2.238	8869	4.136	2.303	3748	0.006
LS/CMI: Antisocial Pattern (0 to 4)	2.056	1.190	8869	1.908	1.154	3748	0.000
Number of observations		23 514			5 393		
Share of sample		0.81			0.19		

Notes: Variables that do not report a standard deviation are binary variables. Column (g) reports p-values for tests of differences in means or proportions between columns (a) and (d).

Table 2: Participation Statistics by Program Category

	Participation rate (a)	Number of programs /participant (b)	Examples of programs (c)
Self-Development	0.064	0.946	Stress/anger management, problem solving, accountability
Violence	0.031	0.185	Violence/aggressiveness management, domestic violence
Addiction	0.060	0.363	Substance abuse, drugs/alcohol addiction
Education	0.075	0.812	Literacy, languages, mathematics
Job skills	0.031	0.226	Resume building, laundry, construction work
Other	0.045	0.468	Leisure, arts, spirituality

Notes: Column (a) shows the proportion of individuals in the sample who participate in at least one program in the corresponding category. Column (b) shows the average number of programs of the corresponding category in which a prisoner is enrolled during his sentence—computed only for those who participate in at least one program of any category.

Table 3: First Stage Regression: Number of programs

	(1)	(2)	(3)
z_{ip}	0.615***	0.614***	0.589***
	(0.050)	(0.049)	(0.046)
F-stat	153.81***	157.24***	166.21***
Average of dep. var.	0.560	0.560	0.560
Randomization controls	✓	✓	✓
Full controls		✓	✓
5-year sample			✓
Observations	28907	28907	28239

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at the prisoner level. Column (1) includes the set of randomization controls (prison- and year fixed effects, and prison fixed effects × sentence duration). Column (2) adds the full set of control variables (type of crime, Indigenous status, age (categorical), indicator for dependents, and number of pretrial detention days). Column (3) restricts to the sample to individuals observed for a minimum of five years upon release. z_{ip} is the number of programs available to an inmate during his incarceration, normalized by its standard deviation. *Num. of prog.* is the number of programs taken up by the individual over the course of his sentence. The F statistic measures the strength of the excluded instrument (z_{ip}).

Table 4: Balance Test

Dependent variable:	(1) Num. of prog.	(2) z_{ip}
Crime: Assault	0.047*	-0.004
	(0.027)	(0.006)
Crime: Burglary&Theft	0.019	0.004
	(0.026)	(0.006)
Crime: Drugs	0.126***	0.015**
	(0.025)	(0.006)
Indigenous	-0.624***	0.026**
	(0.068)	(0.012)
Age: [27-34]	0.037	0.001
	(0.027)	(0.006)
Age: [35-45]	0.030	-0.003
	(0.026)	(0.006)
Age: [46-]	0.018	-0.004
	(0.028)	(0.006)
Pre-trial det. (months)	0.012**	0.000
	(0.006)	(0.001)
Dependents	0.039	0.003
	(0.048)	(0.012)
Constant	0.522***	0.761***
	(0.023)	(0.005)
F-stat	12.54***	1.59
Average of dep. var.	0.560	0.765
Randomization controls	✓	✓
Observations	28907	28907

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The standard errors in parentheses are clustered at the prisoner level. Column (1) shows a regression of the number of programs take-up during the sentence on the full set of controls. Column (2) shows a regression of the instrument on the full set of controls. Both regressions include the set of randomization controls (prison- and year fixed effects, and the prison fixed effects × sentence duration). z_{ip} is the number of programs available to an inmate during his incarceration, normalized its standard deviation. *Num. of prog.* is the number of programs taken-up by an individual during his incarceration. The F statistic measures the joint significance of the controls shown in the table (excluding the randomization controls).

Table 5: Effect of the number of programs on recidivism

Recidivism within...	1 Year	2 Years	3 Years	4 Years	5 Years
Panel A—Recidivism: Provincial incarceration					
OLS					
Num. of prog.	-0.005***	-0.006***	-0.007***	-0.008***	-0.008***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Reduced-Form					
z_{ip}	-0.023***	-0.037***	-0.040***	-0.039***	-0.043***
	(0.005)	(0.006)	(0.006)	(0.006)	(0.007)
2SLS					
Num. of prog.	-0.038***	-0.060***	-0.064***	-0.064***	-0.072***
	(0.009)	(0.011)	(0.011)	(0.011)	(0.013)
Average of dep. var.	0.217	0.300	0.338	0.357	0.373
Panel B—Recidivism: Community sentences					
OLS					
Num. of prog.	-0.003**	-0.004***	-0.007***	-0.007***	-0.008***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Reduced-Form					
z_{ip}	0.014**	0.030***	0.028***	0.019**	0.017*
	(0.006)	(0.007)	(0.007)	(0.007)	(0.008)
2SLS					
Num. of prog.	0.023**	0.048***	0.045***	0.031**	0.028*
	(0.010)	(0.012)	(0.013)	(0.012)	(0.015)
Average of dep. var.	0.157	0.265	0.345	0.406	0.450
Panel C—Recidivism: Federal sentences					
OLS					
Num. of prog.	-0.001	-0.001	-0.001	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Reduced-Form					
z_{ip}	-0.002	-0.002	-0.003	-0.002	-0.004
	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)
2SLS					
Num. of prog.	-0.003	-0.004	-0.004	-0.003	-0.006
	(0.004)	(0.004)	(0.005)	(0.005)	(0.006)
Average of dep. var.	0.014	0.023	0.029	0.032	0.034
Panel D—Recidivism: All sentences					
OLS					
Num. of prog.	-0.007***	-0.010***	-0.010***	-0.009***	-0.009***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Reduced-Form					
z_{ip}	-0.006	-0.005	-0.000	-0.003	-0.004
	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)
2SLS					
Num. of prog.	-0.009	-0.008	-0.000	-0.005	-0.006
	(0.011)	(0.012)	(0.012)	(0.012)	(0.014)
Average of dep. var.	0.338	0.475	0.548	0.591	0.622
Observations	28907	28907	28907	28895	28239

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at the prisoner level. All regressions include the set of randomization controls (prison- and year fixed effects, and the prison fixed effects × sentence duration) and the full controls (type of crime, Indigenous status, age (categorical), indicator for dependents, and number of days of pretrial detention). Each panel uses a different recidivism outcome as the dependent variable. The columns indicate the time window over which recidivism is measured, starting at the planned date of release. z_{ip} is the number of program available during one's sentence, normalized by its standard deviation. *Num. of prog.* is the number of programs taken up during one's incarceration.
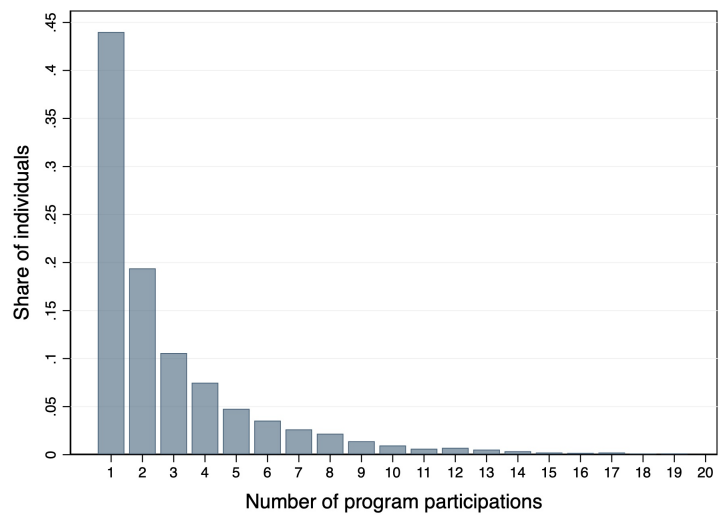
Figure 1: Frequency of program enrollment—participants only

Notes: Around 44% of participants participated in only one program.
The figure is limited to 20 program participation to preserve scaling.
Less than 0.05% of participants participated in more than 20 pro-
grams.
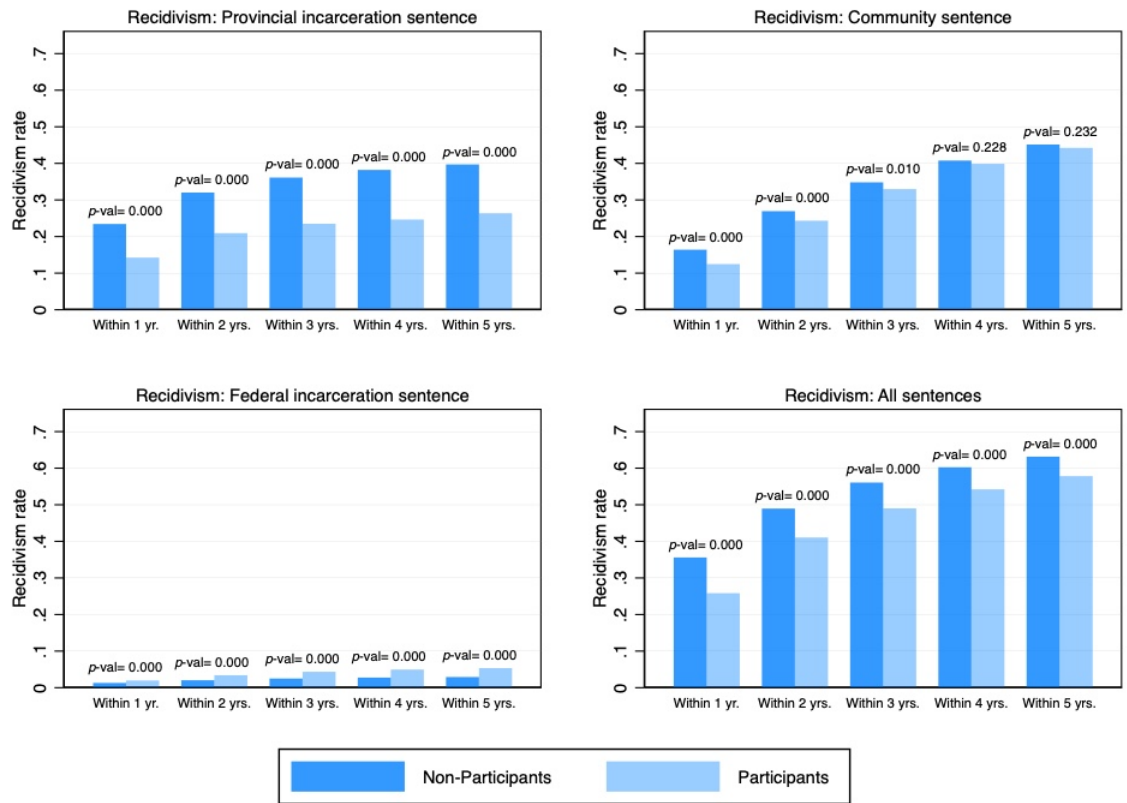
Figure 2: Rates of Recidivism

Note: This figure shows the rates of recidivism within one to five years after the planned release from a provincial prison. The four panels vary the type of sentence considered as recidivism. The p-values test the differences in proportions between recidivism rates for participants and non-participants.
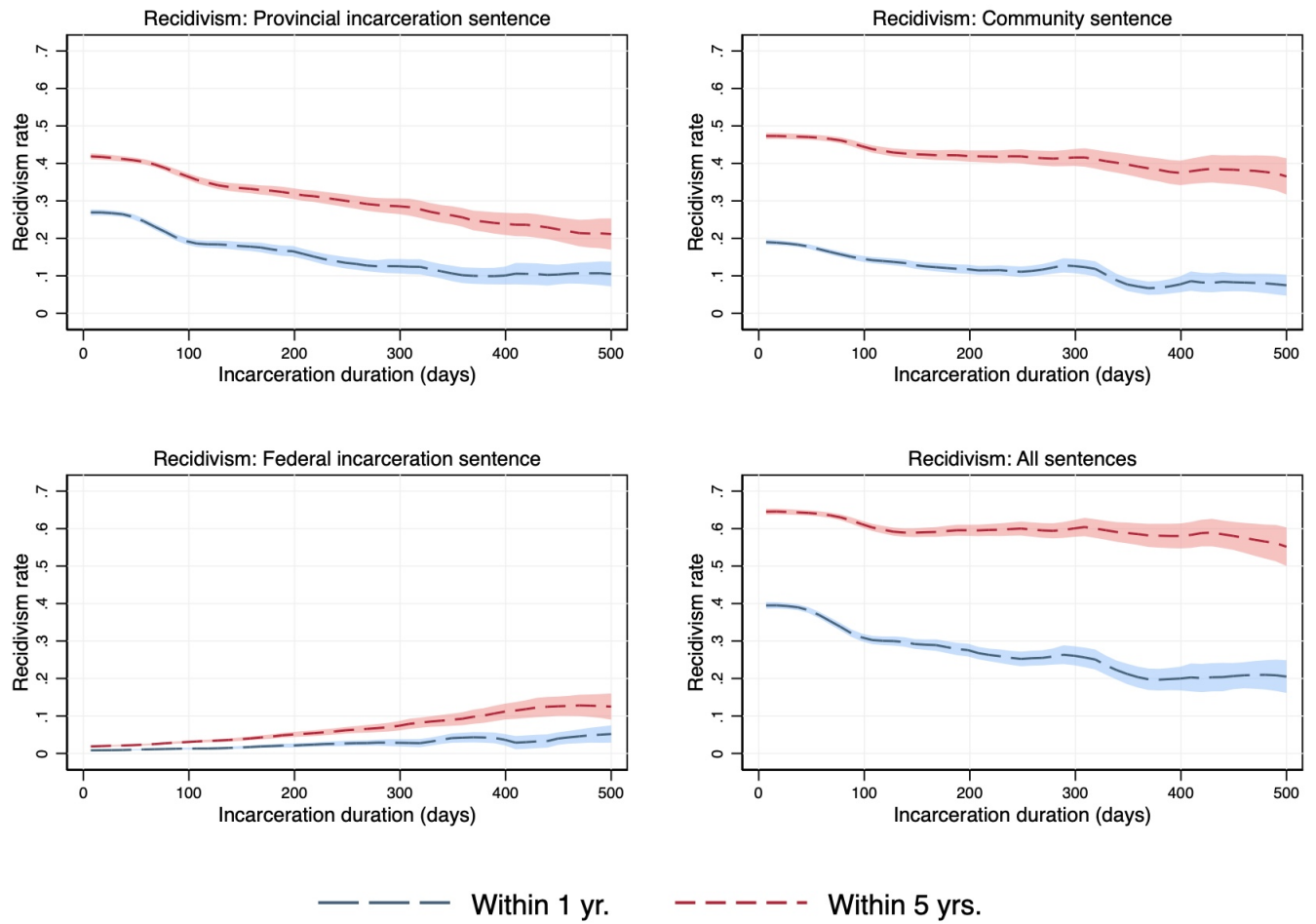
Figure 3: Incarceration Length and Recidivism

Note: This figure shows the rates of recidivism within one year and within five years after the planned release from a provincial prison conditional on the duration of incarceration during the sentence. The four panels vary the type of sentence considered as recidivism. The lines and area present local polynomial smooths of recidivism rates using a bandwidth of 30 days with 95% confidence intervals.
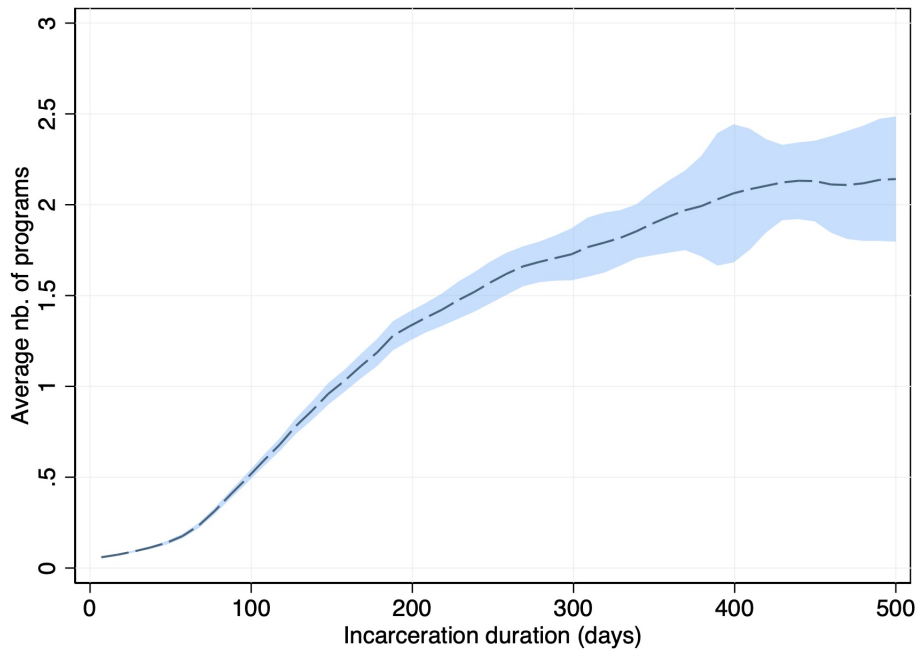
Figure 4: Incarceration Length and Number of Programs Enrolled in

Note: This figure presents the average number of rehabilitation programs a prisoner participates in conditional on the duration of incarceration during the sentence. It includes participants and non-participants. The line and area present local polynomial smooth of participation rate using a bandwidth of 30 days with 95% confidence intervals.
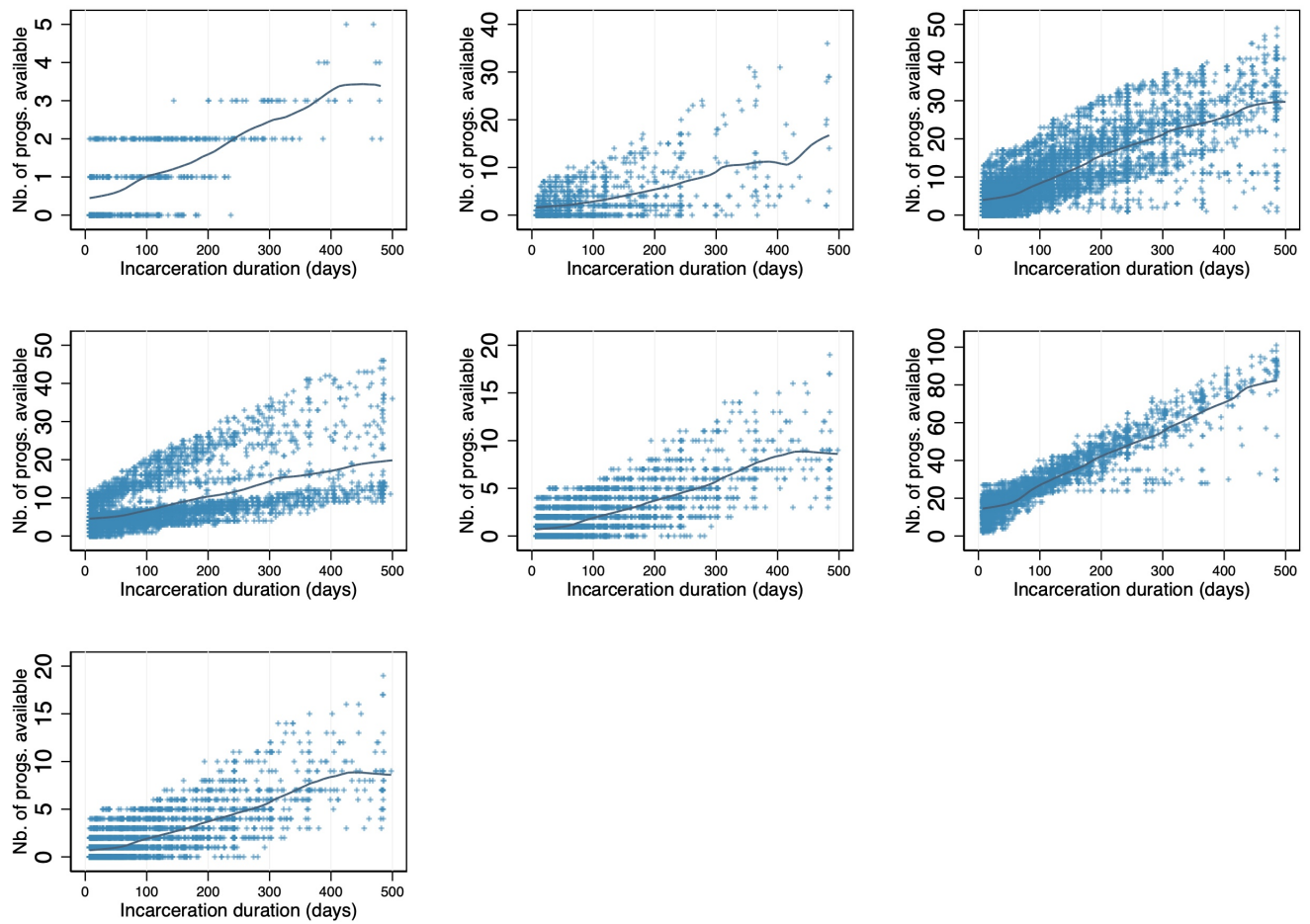
Figure 5: Incarceration Length and Available Programs, by Prison

Note: The figure presents a scatter plot of the number of programs available that a prisoner may enroll in over the course of his incarceration for each prison in our data. The lines are smoothed local polynomial regressions with a bandwidth of 30 days.
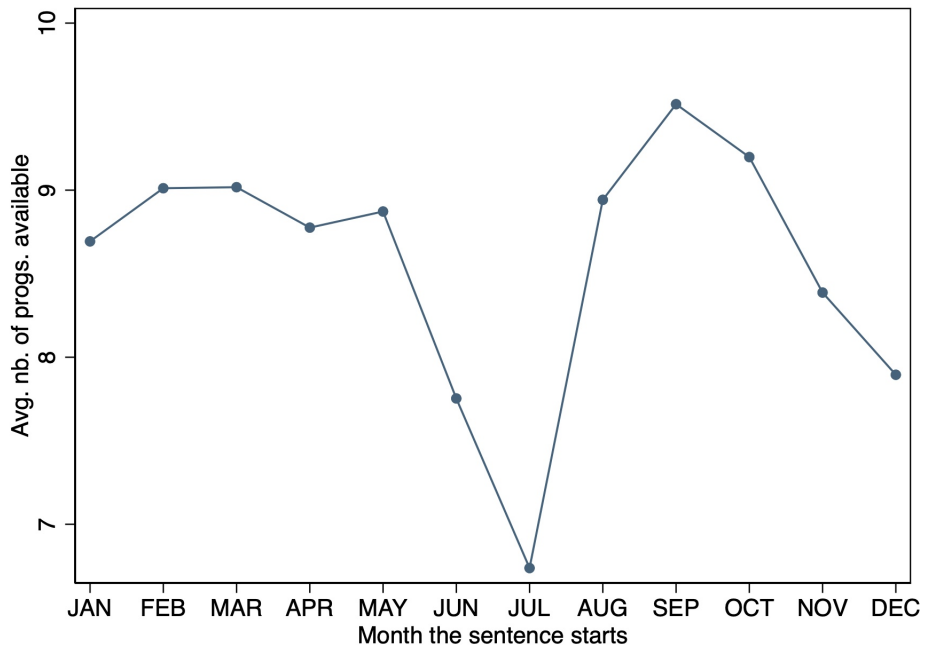
Figure 6: Average Number of Available Programs by Sentencing Month

Note: This figure presents the average number of programs available for a prisoner to enroll in during his sentence conditional on the month his sentence starts.
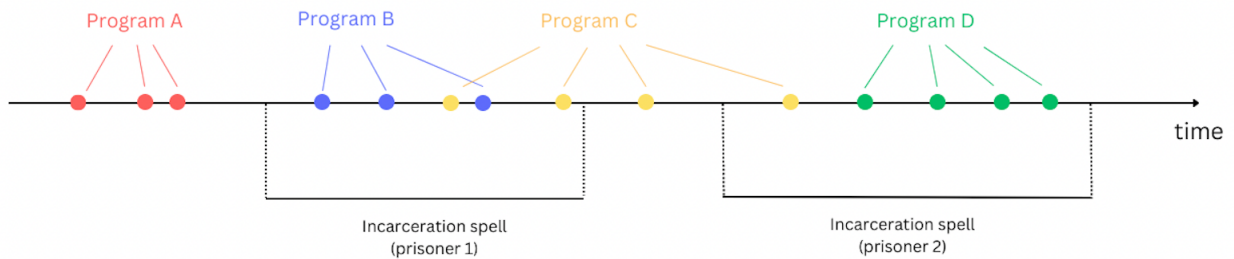
Figure 7: Computation of the instrumental variable

Notes: Each colored dot represents an individual enrolling in a specific colored program. Prisoner 1 can enroll in two programs (B and C) based on his sentence spell and observed enrollments. Prisoner 2 can also enroll in two programs (C and D). Thus, the number of available programs is 2 for both prisoners.
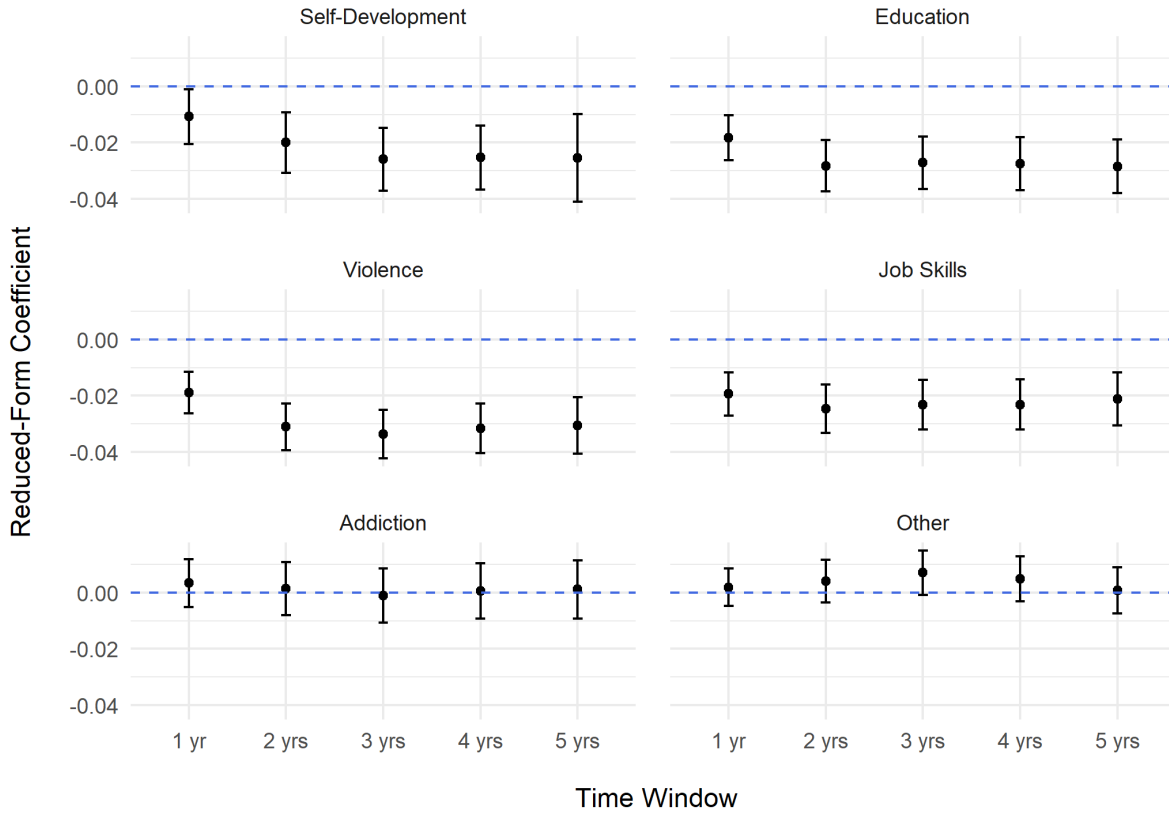
Figure 8: Heterogeneity by Program Type

Notes: Each coefficient is obtained with a reduced-form regression of the reincarceration outcome on the number of available programs of each category, standardized by its standard deviation. All regressions include the set of randomization controls (prison- and year fixed effects, and the sentence duration $\times$ prison fixed effects) and full controls (type of crime, Indigenous status, age (categorical), indicator for at least a dependent, and number of days of pretrial detention).
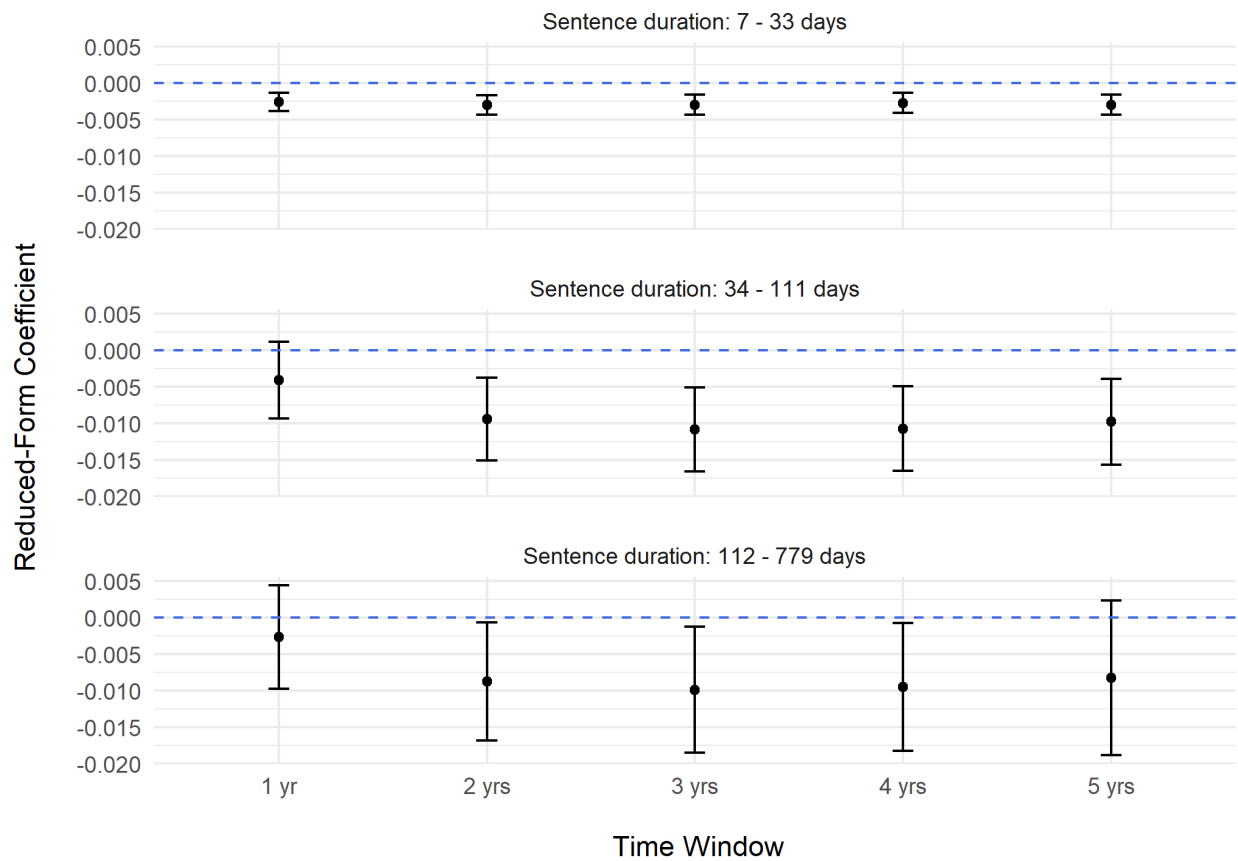
Figure 9: Heterogeneity by Sentence Duration

Notes: Each coefficient is obtained with a reduced-form regression of the reincarceration outcome on the number of available programs by month of incarceration. All regressions include the set of randomization controls (prison- and year fixed effects, and the sentence duration × prison fixed effects) and full controls (type of crime, Indigenous status, age (categorical), indicator for at least a dependent, and number of days of pretrial detention).

A Appendix - Additional Figures and Tables
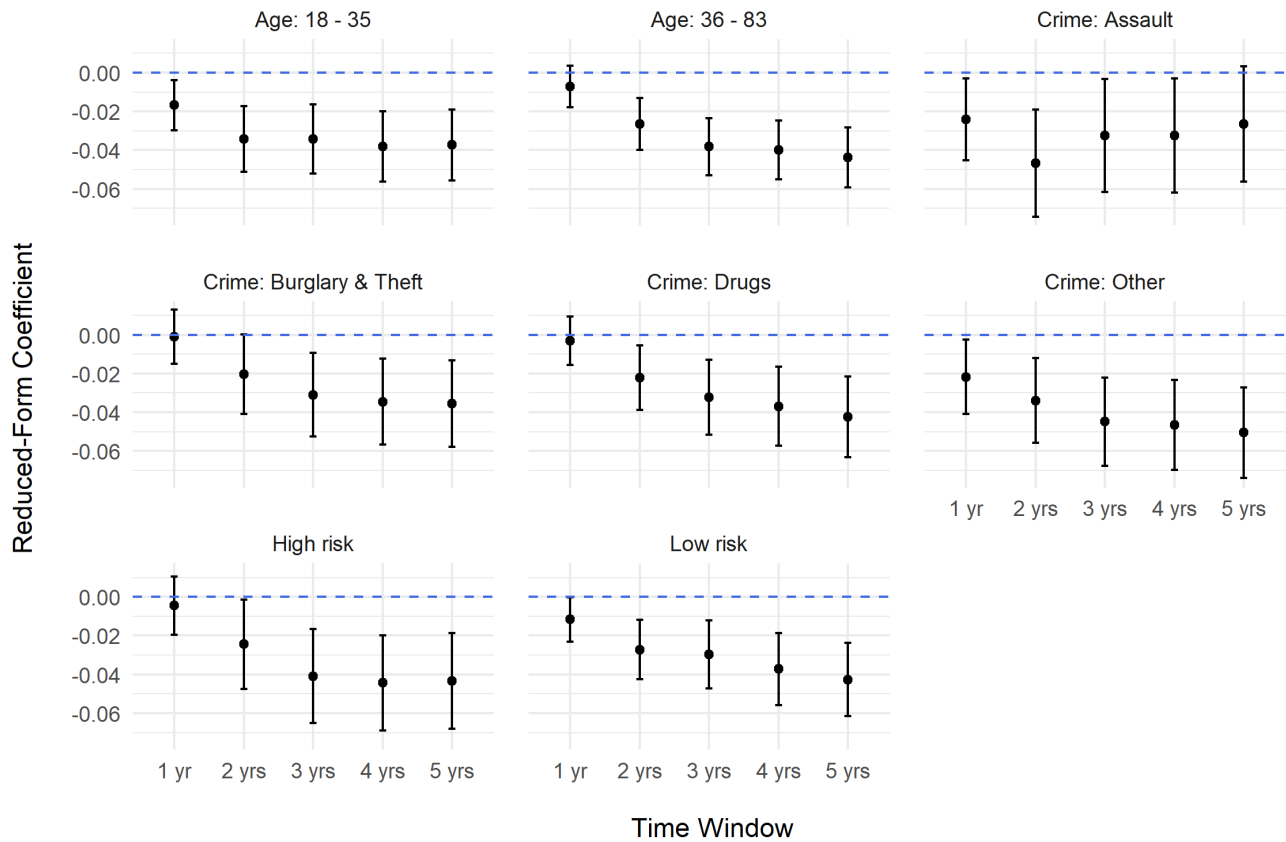
Figure A.1: Heterogeneity by Inmates' Characteristics

Notes: Each coefficient is obtained with a reduced-form regression on each subsample of interest of the reincarceration outcome on the number of available programs, standardized by its standard deviation. All regressions include the set of randomization controls (prison- and year fixed effects, and the sentence duration × prison fixed effects) and full controls (type of crime, Indigenous status, age (categorical), indicator for at least a dependent, and number of days of pretrial detention). The last two plots (*High risk* and *Low risk*) restrict the sample to inmates with risk scores.

Table A.1: Effect of the number of programs on recidivism—Participants only

Recidivism within...	1 Year	2 Years	3 Years	4 Years	5 Years
Panel A—Recidivism: Provincial incarceration sentences					
OLS					
Num. of prog.	-0.002*	-0.003**	-0.004**	-0.004**	-0.004*
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Reduced-Form					
z_{ip}	-0.023**	-0.033***	-0.034***	-0.036***	-0.030*
	(0.010)	(0.011)	(0.012)	(0.012)	(0.017)
2SLS					
Num. of prog.	-0.025**	-0.035**	-0.037**	-0.039***	-0.041*
	(0.012)	(0.014)	(0.014)	(0.015)	(0.025)
Average of dep. var.	0.142	0.209	0.235	0.246	0.264
Panel B—Recidivism: Community sentences					
OLS					
Num. of prog.	0.000	-0.002	-0.004*	-0.004*	-0.005**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Reduced-Form					
z_{ip}	0.017	0.025*	0.040**	0.026	0.004
	(0.012)	(0.015)	(0.016)	(0.017)	(0.022)
2SLS					
Num. of prog.	0.019	0.027	0.043**	0.028	0.005
	(0.013)	(0.017)	(0.019)	(0.019)	(0.030)
Average of dep. var.	0.125	0.243	0.330	0.399	0.442
Panel C—Recidivism: Federal sentences					
OLS					
Num. of prog.	-0.001	-0.001	-0.000	-0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Reduced-Form					
z_{ip}	0.002	0.004	0.004	0.003	-0.001
	(0.005)	(0.006)	(0.007)	(0.007)	(0.010)
2SLS					
Num. of prog.	0.002	0.005	0.004	0.003	-0.002
	(0.005)	(0.007)	(0.007)	(0.008)	(0.014)
Average of dep. var.	0.020	0.034	0.044	0.050	0.053
Panel D—Recidivism: All sentences					
OLS					
Num. of prog.	-0.003	-0.006***	-0.006***	-0.005**	-0.006**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Reduced-Form					
z_{ip}	-0.003	0.002	0.021	0.010	-0.005
	(0.014)	(0.016)	(0.016)	(0.017)	(0.021)
2SLS					
Num. of prog.	-0.004	0.003	0.023	0.011	-0.006
	(0.015)	(0.018)	(0.018)	(0.018)	(0.029)
Average of dep. var.	0.258	0.411	0.490	0.542	0.578
Observations	5393	5393	5393	5384	5055

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at the prisoner level. All regressions include the set of randomization controls (prison- and year fixed effects, and the sentence duration × prison fixed effects) and full controls (type of crime, Indigenous status, age (categorical), indicator for at least a dependent, and number of days of pretrial detention). Each panel uses a different recidivism outcome as the dependent variable. Columns indicate the time window over which recidivism is measured, starting at the planned release date. z_{ip} is the number of program openings during inmate i's sentence, standardized by its standard deviation. *Num. of prog.* is the number of programs the individual participated in during the sentence. The sample is restricted to participants only.

Table A.2: Effect of the number of programs on recidivism—No additional controls

Recidivism within...	1 Year	2 Years	3 Years	4 Years	5 Years
Panel A—Recidivism: Provincial incarceration sentences					
OLS					
Num. of prog.	-0.007***	-0.010***	-0.010***	-0.011***	-0.012***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Reduced-Form					
z_{ip}	-0.024***	-0.038***	-0.041***	-0.040***	-0.046***
	(0.005)	(0.006)	(0.006)	(0.006)	(0.007)
2SLS					
Num. of prog.	-0.040***	-0.062***	-0.066***	-0.066***	-0.077***
	(0.009)	(0.011)	(0.011)	(0.011)	(0.013)
Average of dep. var.	0.217	0.300	0.338	0.357	0.373
Panel B—Recidivism: Community sentences					
OLS					
Num. of prog.	-0.004***	-0.006***	-0.009***	-0.010***	-0.011***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Reduced-Form					
z_{ip}	0.014**	0.029***	0.027***	0.018**	0.014
	(0.006)	(0.007)	(0.008)	(0.008)	(0.009)
2SLS					
Num. of prog.	0.022**	0.047***	0.044***	0.030**	0.023
	(0.010)	(0.012)	(0.013)	(0.013)	(0.015)
Average of dep. var.	0.157	0.265	0.345	0.406	0.450
Panel C—Recidivism: Federal sentences					
OLS					
Num. of prog.	-0.001	-0.001	-0.001	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Reduced-Form					
z_{ip}	-0.002	-0.003	-0.003	-0.002	-0.003
	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)
2SLS					
Num. of prog.	-0.003	-0.004	-0.005	-0.003	-0.006
	(0.004)	(0.005)	(0.005)	(0.005)	(0.006)
Average of dep. var.	0.014	0.023	0.029	0.032	0.034
Panel D—Recidivism: All sentences					
OLS					
Num. of prog.	-0.010***	-0.013***	-0.014***	-0.013***	-0.013***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Reduced-Form					
z_{ip}	-0.007	-0.006	-0.002	-0.004	-0.008
	(0.007)	(0.008)	(0.008)	(0.008)	(0.009)
2SLS					
Num. of prog.	-0.012	-0.010	-0.003	-0.007	-0.013
	(0.011)	(0.012)	(0.013)	(0.013)	(0.014)
Average of dep. var.	0.338	0.475	0.548	0.591	0.622
Observations	28907	28907	28907	28895	28239

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at the prisoner level. All regressions include only the set of randomization controls (prison- and year fixed effects and prison-specific sentence duration.) Each panel uses a different recidivism outcome as the dependent variable. Columns indicate the time window over which recidivism is measured, starting at the planned release date. z_{ip} is the number of program openings during inmate i's sentence, standardized by its standard deviation. *Num. of prog.* is the number of programs the individual participated in during the sentence.

Table A.3: Effect of the number of programs on recidivism—Offenders with risk scores

Recidivism within...	1 Year	2 Years	3 Years	4 Years	5 Years
Panel A—Recidivism: Provincial incarceration sentences					
OLS					
Num. of prog.	-0.004**	-0.004**	-0.005**	-0.005***	-0.006***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Reduced-Form					
z_{ip}	-0.026***	-0.048***	-0.051***	-0.052***	-0.054***
	(0.008)	(0.009)	(0.009)	(0.009)	(0.011)
2SLS					
Num. of prog.	-0.032***	-0.059***	-0.062***	-0.063***	-0.062***
	(0.011)	(0.013)	(0.014)	(0.014)	(0.014)
Average of dep. var.	0.201	0.287	0.328	0.346	0.364
Panel B—Recidivism: Community sentences					
OLS					
Num. of prog.	-0.002	-0.003	-0.005**	-0.005**	-0.006***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Reduced-Form					
z_{ip}	0.015	0.031***	0.033***	0.022**	0.015
	(0.009)	(0.011)	(0.011)	(0.011)	(0.013)
2SLS					
Num. of prog.	0.018	0.037***	0.041***	0.027*	0.018
	(0.011)	(0.014)	(0.015)	(0.014)	(0.015)
Average of dep. var.	0.136	0.245	0.331	0.399	0.446
Panel C—Recidivism: Federal sentences					
OLS					
Num. of prog.	-0.001	-0.002**	-0.001	-0.001	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Reduced-Form					
z_{ip}	-0.004	-0.004	-0.004	-0.005	-0.005
	(0.004)	(0.005)	(0.005)	(0.006)	(0.006)
2SLS					
Num. of prog.	-0.005	-0.005	-0.005	-0.006	-0.005
	(0.005)	(0.006)	(0.007)	(0.007)	(0.007)
Average of dep. var.	0.018	0.031	0.038	0.042	0.045
Panel D—Recidivism: All sentences					
OLS					
Num. of prog.	-0.005***	-0.007***	-0.007***	-0.007***	-0.007***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Reduced-Form					
z_{ip}	-0.009	-0.014	-0.003	-0.006	-0.010
	(0.011)	(0.011)	(0.011)	(0.011)	(0.012)
2SLS					
Num. of prog.	-0.011	-0.017	-0.003	-0.007	-0.011
	(0.013)	(0.014)	(0.014)	(0.013)	(0.014)
Average of dep. var.	0.318	0.468	0.548	0.595	0.628
Observations	12617	12617	12617	12616	12217

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at the prisoner level. All regressions include the set of randomization controls (prison- and year fixed effects, and the sentence duration × prison fixed effects), full controls (type of crime, Indigenous status, age (categorical), indicator for at least a dependent, and number of days of pretrial detention) and the eight LS/CMI risk scores. Each panel uses a different recidivism outcome as the dependent variable. Columns indicate the time window over which recidivism is measured, starting at the planned release date. z_{ip} is the number of program openings during inmate i's sentence, standardized by its standard deviation. *Num. of prog.* is the number of programs the individual participated in during the sentence. The sample is restricted to individuals with risk scores.

Table A.4: Effect of the number of programs on recidivism—Alternative cluster

Recidivism within...	1 Year	2 Years	3 Years	4 Years	5 Years
Panel A—Recidivism: Provincial incarceration sentences					
OLS					
Num. of prog.	-0.005***	-0.006***	-0.007***	-0.008***	-0.008***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Reduced-Form					
z_{ip}	-0.023***	-0.037***	-0.040***	-0.039***	-0.043***
	(0.008)	(0.012)	(0.012)	(0.012)	(0.012)
2SLS					
Num. of prog.	-0.038***	-0.060***	-0.064***	-0.064***	-0.072***
	(0.013)	(0.021)	(0.021)	(0.021)	(0.025)
Average of dep. var.	0.217	0.300	0.338	0.357	0.373
Panel B—Recidivism: Community sentences					
OLS					
Num. of prog.	-0.003**	-0.004**	-0.007***	-0.007***	-0.008***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Reduced-Form					
z_{ip}	0.014*	0.030**	0.028**	0.019*	0.017
	(0.008)	(0.011)	(0.011)	(0.010)	(0.011)
2SLS					
Num. of prog.	0.023*	0.048**	0.045**	0.031*	0.028
	(0.012)	(0.018)	(0.017)	(0.016)	(0.018)
Average of dep. var.	0.157	0.265	0.345	0.406	0.450
Panel C—Recidivism: Federal sentences					
OLS					
Num. of prog.	-0.001	-0.001	-0.001	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Reduced-Form					
z_{ip}	-0.002	-0.002	-0.003	-0.002	-0.004
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
2SLS					
Num. of prog.	-0.003	-0.004	-0.004	-0.003	-0.006
	(0.003)	(0.004)	(0.004)	(0.005)	(0.005)
Average of dep. var.	0.014	0.023	0.029	0.032	0.034
Panel D—Recidivism: All sentences					
OLS					
Num. of prog.	-0.007***	-0.010***	-0.010***	-0.009***	-0.009***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Reduced-Form					
z_{ip}	-0.006	-0.005	-0.000	-0.003	-0.004
	(0.006)	(0.008)	(0.008)	(0.007)	(0.008)
2SLS					
Num. of prog.	-0.009	-0.008	-0.000	-0.005	-0.006
	(0.009)	(0.013)	(0.013)	(0.011)	(0.014)
Average of dep. var.	0.338	0.475	0.548	0.591	0.622
Observations	28907	28907	28907	28895	28239

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at the prison-year level. All regressions include the set of randomization controls (prison- and year fixed effects, and the sentence duration × prison fixed effects) and full controls (type of crime, Indigenous status, age (categorical), indicator for at least a dependent, and number of days of pretrial detention). Each panel uses a different recidivism outcome as the dependent variable. Columns indicate the time window over which recidivism is measured, starting at the planned release date. z_{ip} is the number of program openings during inmate i's sentence, standardized by its standard deviation. *Num. of prog.* is the number of programs the individual participated in during the sentence.

Table A.5: Effect of the number of programs on recidivism—First observation per individual

Recidivism within...	1 Year	2 Years	3 Years	4 Years	5 Years
Panel A—Recidivism: Provincial incarceration sentences					
OLS					
Num. of prog.	-0.002	-0.005***	-0.006***	-0.007***	-0.008***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Reduced-Form					
z_{ip}	-0.016***	-0.029***	-0.032***	-0.032***	-0.037***
	(0.005)	(0.006)	(0.007)	(0.007)	(0.008)
2SLS					
Num. of prog.	-0.024***	-0.045***	-0.048***	-0.049***	-0.062***
	(0.009)	(0.011)	(0.011)	(0.011)	(0.015)
Average of dep. var.	0.156	0.232	0.269	0.288	0.304
Panel B—Recidivism: Community sentences					
OLS					
Num. of prog.	-0.001	-0.003**	-0.006***	-0.006***	-0.008***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Reduced-Form					
z_{ip}	0.009	0.017**	0.016*	0.010	0.006
	(0.006)	(0.008)	(0.008)	(0.009)	(0.010)
2SLS					
Num. of prog.	0.014	0.026**	0.025*	0.015	0.009
	(0.009)	(0.012)	(0.013)	(0.014)	(0.017)
Average of dep. var.	0.120	0.208	0.276	0.333	0.376
Panel C—Recidivism: Federal sentences					
OLS					
Num. of prog.	-0.001	-0.001	-0.000	-0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Reduced-Form					
z_{ip}	-0.004	-0.004	-0.004	-0.003	-0.006
	(0.003)	(0.003)	(0.004)	(0.004)	(0.005)
2SLS					
Num. of prog.	-0.007	-0.006	-0.006	-0.004	-0.010
	(0.004)	(0.005)	(0.006)	(0.006)	(0.008)
Average of dep. var.	0.013	0.022	0.028	0.031	0.034
Panel D—Recidivism: All sentences					
OLS					
Num. of prog.	-0.004***	-0.009***	-0.009***	-0.008***	-0.009***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Reduced-Form					
z_{ip}	-0.008	-0.011	-0.007	-0.009	-0.013
	(0.008)	(0.009)	(0.009)	(0.009)	(0.010)
2SLS					
Num. of prog.	-0.012	-0.018	-0.011	-0.014	-0.022
	(0.012)	(0.013)	(0.014)	(0.014)	(0.017)
Average of dep. var.	0.257	0.386	0.458	0.504	0.538
Observations	20148	20148	20148	20140	19730

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors in parentheses. All regressions include the set of randomization controls (prison- and year fixed effects, and the sentence duration × prison fixed effects) and full controls (type of crime, Indigenous status, age (categorical), indicator for at least a dependent, and number of days of pretrial detention). Each panel uses a different recidivism outcome as the dependent variable. Columns indicate the time window over which recidivism is measured, starting at the planned release date. z_{ip} is the number of program openings during inmate i's sentence, standardized by its standard deviation. *Num. of prog.* is the number of programs the individual participated in during the sentence. The sample is restricted to the first observation of each individual.

Table A.6: Effect of the number of programs on recidivism—With month fixed-effects

Recidivism within...	1 Year	2 Years	3 Years	4 Years	5 Years
Panel A—Recidivism: Provincial incarceration sentences					
OLS					
Num. of prog.	-0.005***	-0.006***	-0.007***	-0.008***	-0.008***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Reduced-Form					
z_{ip}	-0.022***	-0.036***	-0.039***	-0.039***	-0.042***
	(0.005)	(0.006)	(0.006)	(0.006)	(0.007)
2SLS					
Num. of prog.	-0.034***	-0.058***	-0.062***	-0.062***	-0.070***
	(0.009)	(0.010)	(0.011)	(0.011)	(0.013)
Average of dep. var.	0.217	0.300	0.338	0.357	0.373
Panel B—Recidivism: Community sentences					
OLS					
Num. of prog.	-0.003**	-0.004***	-0.007***	-0.007***	-0.008***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Reduced-Form					
z_{ip}	0.016***	0.033***	0.031***	0.022***	0.021**
	(0.006)	(0.007)	(0.007)	(0.007)	(0.009)
2SLS					
Num. of prog.	0.025***	0.053***	0.049***	0.035***	0.034**
	(0.009)	(0.012)	(0.012)	(0.012)	(0.015)
Average of dep. var.	0.157	0.265	0.345	0.406	0.450
Panel C—Recidivism: Federal sentences					
OLS					
Num. of prog.	-0.001	-0.001	-0.001	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Reduced-Form					
z_{ip}	-0.002	-0.002	-0.003	-0.002	-0.004
	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)
2SLS					
Num. of prog.	-0.003	-0.004	-0.004	-0.004	-0.007
	(0.004)	(0.004)	(0.005)	(0.005)	(0.006)
Average of dep. var.	0.014	0.023	0.029	0.032	0.034
Panel D—Recidivism: All sentences					
OLS					
Num. of prog.	-0.007***	-0.010***	-0.010***	-0.009***	-0.009***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Reduced-Form					
z_{ip}	-0.003	-0.001	0.003	-0.000	-0.001
	(0.007)	(0.007)	(0.008)	(0.007)	(0.008)
2SLS					
Num. of prog.	-0.005	-0.002	0.004	-0.000	-0.002
	(0.011)	(0.012)	(0.012)	(0.012)	(0.014)
Average of dep. var.	0.338	0.475	0.548	0.591	0.622
Observations	28907	28907	28907	28895	28239

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at the prisoner level. All regressions include the set of randomization controls (prison- and year fixed effects, and the sentence duration × prison fixed effects), full controls (type of crime, Indigenous status, age (categorical), indicator for at least a dependent, and number of days of pretrial detention) and month-of-sentencing fixed effects. Each panel uses a different recidivism outcome as the dependent variable. Columns indicate the time window over which recidivism is measured, starting at the planned release date. z_{ip} is the number of program openings during inmate i's sentence, standardized by its standard deviation. *Num. of prog.* is the number of programs the individual participated in during the sentence.

Table A.7: Effect of the number of programs on recidivism—Alternative instrument definition

Recidivism within...	1 Year	2 Years	3 Years	4 Years	5 Years
Panel A—Recidivism: Provincial incarceration sentences					
OLS					
Num. of prog.	-0.006***	-0.008***	-0.008***	-0.009***	-0.009***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Reduced-Form					
z_{ip}	-0.023***	-0.037***	-0.040***	-0.039***	-0.043***
	(0.005)	(0.006)	(0.006)	(0.006)	(0.007)
2SLS					
Num. of prog.	-0.035***	-0.056***	-0.059***	-0.059***	-0.068***
	(0.008)	(0.009)	(0.010)	(0.010)	(0.012)
Average of dep. var.	0.217	0.300	0.338	0.357	0.373
Panel B—Recidivism: Community sentences					
OLS					
Num. of prog.	-0.004***	-0.007***	-0.009***	-0.010***	-0.010***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Reduced-Form					
z_{ip}	0.014**	0.030***	0.028***	0.019**	0.017*
	(0.006)	(0.007)	(0.007)	(0.007)	(0.008)
2SLS					
Num. of prog.	0.021**	0.045***	0.042***	0.028**	0.026*
	(0.009)	(0.011)	(0.012)	(0.011)	(0.014)
Average of dep. var.	0.157	0.265	0.345	0.406	0.450
Panel C—Recidivism: Federal sentences					
OLS					
Num. of prog.	-0.001	-0.001*	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Reduced-Form					
z_{ip}	-0.002	-0.002	-0.003	-0.002	-0.004
	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)
2SLS					
Num. of prog.	-0.003	-0.004	-0.004	-0.003	-0.006
	(0.003)	(0.004)	(0.004)	(0.005)	(0.006)
Average of dep. var.	0.014	0.023	0.029	0.032	0.034
Panel D—Recidivism: All sentences					
OLS					
Num. of prog.	-0.010***	-0.013***	-0.013***	-0.012***	-0.012***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Reduced-Form					
z_{ip}	-0.006	-0.005	-0.000	-0.003	-0.004
	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)
2SLS					
Num. of prog.	-0.008	-0.007	-0.000	-0.004	-0.006
	(0.010)	(0.011)	(0.011)	(0.011)	(0.013)
Average of dep. var.	0.338	0.475	0.548	0.591	0.622
Observations	28907	28907	28907	28895	28239

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at the prisoner level. All regressions include the set of randomization controls (prison- and year fixed effects, and the sentence duration × prison fixed effects) and full controls (type of crime, Indigenous status, age (categorical), indicator for at least a dependent, and number of days of pretrial detention). Each panel uses a different recidivism outcome as the dependent variable. Columns indicate the time window over which recidivism is measured, starting at the planned release date. z_{ip} is the number of program openings during inmate i's arrival and planned release, standardized by its standard deviation. *Num. of prog.* is the number of programs the individual participated in during the sentence.

Table A.8: Effect of the number of programs on recidivism—Alternative definition (beginning of sentence)

Recidivism within...	1 Year	2 Years	3 Years	4 Years	5 Years
Panel A—Recidivism: Provincial incarceration sentences					
OLS					
Num. of prog.	-0.002***	-0.006***	-0.007***	-0.007***	-0.008***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Reduced-Form					
z_{ip}	-0.012***	-0.030***	-0.036***	-0.039***	-0.040***
	(0.004)	(0.005)	(0.006)	(0.006)	(0.006)
2SLS					
Num. of prog.	-0.019***	-0.049***	-0.058***	-0.063***	-0.065***
	(0.007)	(0.010)	(0.011)	(0.011)	(0.011)
Average of dep. var.	0.179	0.280	0.327	0.352	0.365
Panel B—Recidivism: Community sentences					
OLS					
Num. of prog.	-0.004***	-0.004***	-0.006***	-0.006***	-0.007***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Reduced-Form					
z_{ip}	-0.001	0.022***	0.025***	0.027***	0.019**
	(0.004)	(0.006)	(0.007)	(0.007)	(0.007)
2SLS					
Num. of prog.	-0.001	0.036***	0.040***	0.043***	0.031**
	(0.007)	(0.010)	(0.012)	(0.012)	(0.012)
Average of dep. var.	0.120	0.232	0.320	0.386	0.435
Panel C—Recidivism: Federal sentences					
OLS					
Num. of prog.	-0.001***	-0.000	-0.001	-0.001	-0.001
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Reduced-Form					
z_{ip}	-0.000	-0.003	-0.004	-0.002	-0.002
	(0.001)	(0.002)	(0.003)	(0.003)	(0.003)
2SLS					
Num. of prog.	-0.000	-0.005	-0.006	-0.003	-0.003
	(0.002)	(0.004)	(0.005)	(0.005)	(0.005)
Average of dep. var.	0.008	0.018	0.025	0.030	0.033
Panel D—Recidivism: All sentences					
OLS					
Num. of prog.	-0.006***	-0.009***	-0.010***	-0.009***	-0.009***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Reduced-Form					
z_{ip}	-0.006	-0.007	-0.005	0.002	-0.001
	(0.005)	(0.007)	(0.007)	(0.007)	(0.007)
2SLS					
Num. of prog.	-0.010	-0.011	-0.007	0.004	-0.001
	(0.009)	(0.011)	(0.012)	(0.012)	(0.012)
Average of dep. var.	0.269	0.433	0.523	0.576	0.609
Observations	28907	28907	28907	28907	28907

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at the prisoner level. All regressions include the set of randomization controls (prison- and year fixed effects, and the sentence duration × prison fixed effects) and full controls (type of crime, Indigenous status, age (categorical), indicator for at least a dependent, and number of days of pretrial detention). Each panel uses a different recidivism outcome as the dependent variable. Columns indicate the time window over which recidivism is measured, starting at the beginning of the sentence. z_{ip} is the number of program openings during inmate i's sentence, standardized by its standard deviation. *Num. of prog.* is the number of programs the individual participated in during the sentence.

Table A.9: Effect of the number of programs on recidivism—Alternative definition (release)

Recidivism within...	1 Year	2 Years	3 Years	4 Years	5 Years
Panel A—Recidivism: Provincial incarceration sentences					
OLS					
Num. of prog.	-0.005***	-0.007***	-0.007***	-0.008***	-0.008***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Reduced-Form					
z_{ip}	-0.022***	-0.035***	-0.039***	-0.040***	-0.044***
	(0.005)	(0.006)	(0.006)	(0.006)	(0.007)
2SLS					
Num. of prog.	-0.035***	-0.057***	-0.064***	-0.064***	-0.071***
	(0.009)	(0.010)	(0.011)	(0.011)	(0.013)
Average of dep. var.	0.216	0.298	0.337	0.357	0.371
Panel B—Recidivism: Community sentences					
OLS					
Num. of prog.	-0.003**	-0.004***	-0.007***	-0.007***	-0.008***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Reduced-Form					
z_{ip}	0.012**	0.030***	0.028***	0.019**	0.014*
	(0.006)	(0.007)	(0.007)	(0.007)	(0.008)
2SLS					
Num. of prog.	0.019**	0.048***	0.045***	0.031**	0.023*
	(0.009)	(0.012)	(0.013)	(0.012)	(0.014)
Average of dep. var.	0.155	0.263	0.343	0.405	0.447
Panel C—Recidivism: Federal sentences					
OLS					
Num. of prog.	-0.001	-0.001	-0.001	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Reduced-Form					
z_{ip}	-0.002	-0.002	-0.003	-0.002	-0.004
	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)
2SLS					
Num. of prog.	-0.003	-0.004	-0.004	-0.003	-0.006
	(0.004)	(0.004)	(0.005)	(0.005)	(0.006)
Average of dep. var.	0.014	0.023	0.028	0.032	0.033
Panel D—Recidivism: All sentences					
OLS					
Num. of prog.	-0.007***	-0.010***	-0.011***	-0.009***	-0.010***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Reduced-Form					
z_{ip}	-0.006	-0.003	-0.001	-0.003	-0.007
	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)
2SLS					
Num. of prog.	-0.010	-0.005	-0.001	-0.005	-0.011
	(0.011)	(0.012)	(0.012)	(0.012)	(0.013)
Average of dep. var.	0.335	0.472	0.546	0.590	0.619
Observations	28907	28907	28907	28902	28396

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at the prisoner level. All regressions include the set of randomization controls (prison- and year fixed effects, and the sentence duration × prison fixed effects) and full controls (type of crime, Indigenous status, age (categorical), indicator for at least a dependent, and number of days of pretrial detention). Each panel uses a different recidivism outcome as the dependent variable. Columns indicate the time window over which recidivism is measured, starting at the release. z_{ip} is the number of program openings during inmate i's sentence, standardized by its standard deviation. *Num. of prog.* is the number of programs the individual participated in during the sentence.