

Online Appendix

Prison Rehabilitation Programs and Recidivism: Evidence from Variations in Availability

William Arbour*

Guy Lacroix[†]

Steeve Marchand[‡]

*Department of Economics, University of Montreal (william.arbour@umontreal.ca)

[†]Department of Economics, Université Laval (guy.lacroix@ecn.ulaval.ca).

[‡]Melbourne Institute: Applied Economic & Social Research, University of Melbourne (steeve.marchand@unimelb.edu.au).

A Additional Figures

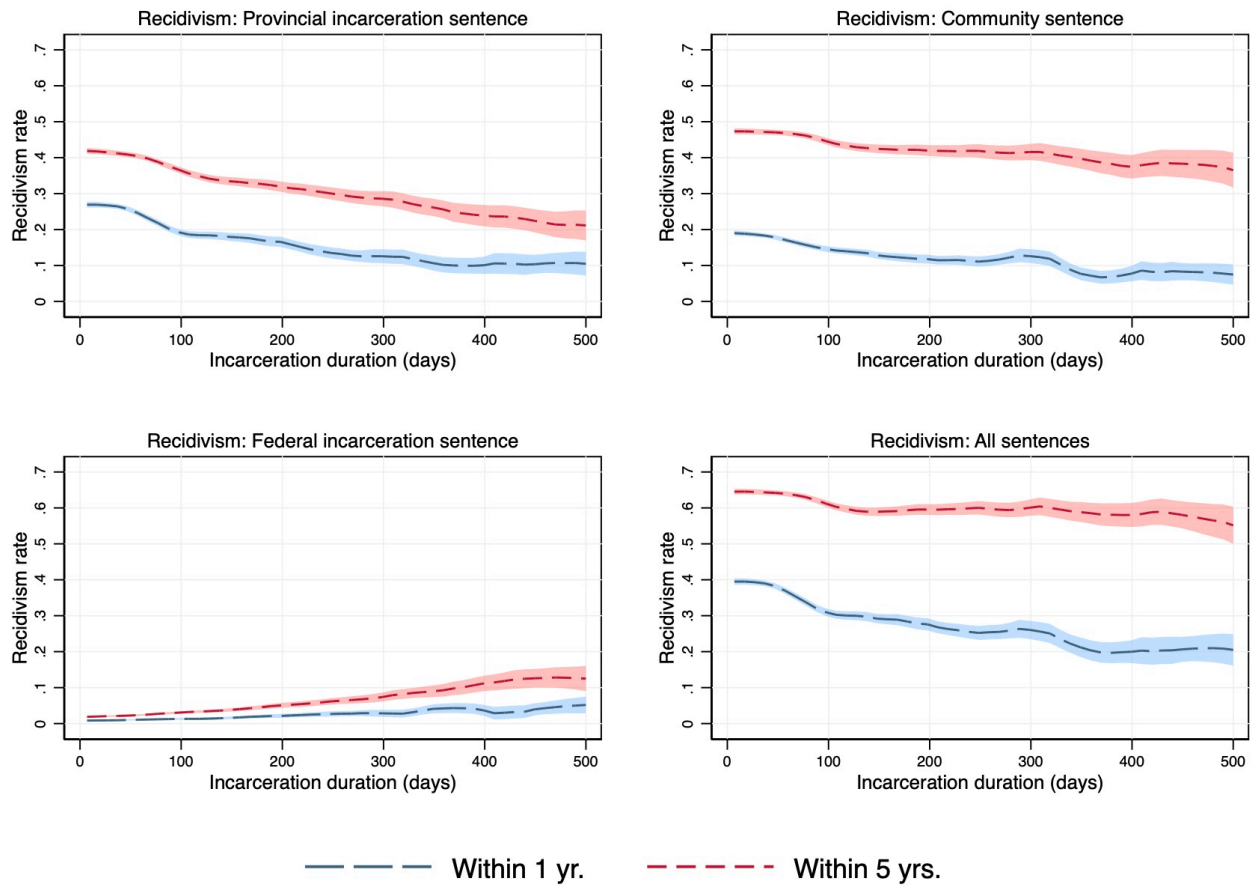


Figure A.1: Incarceration Length and Recidivism

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.

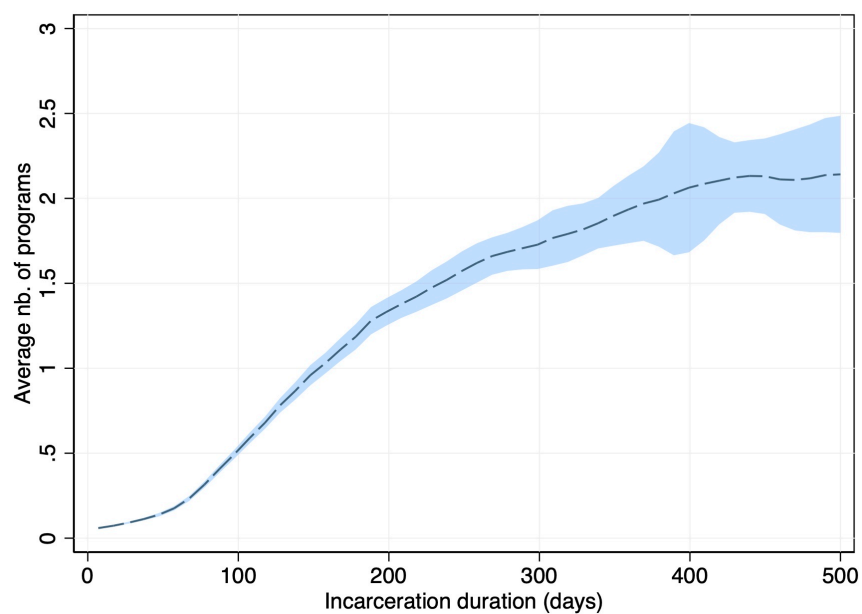


Figure A.2: Incarceration Length and Number of Programs Enrolled in

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.

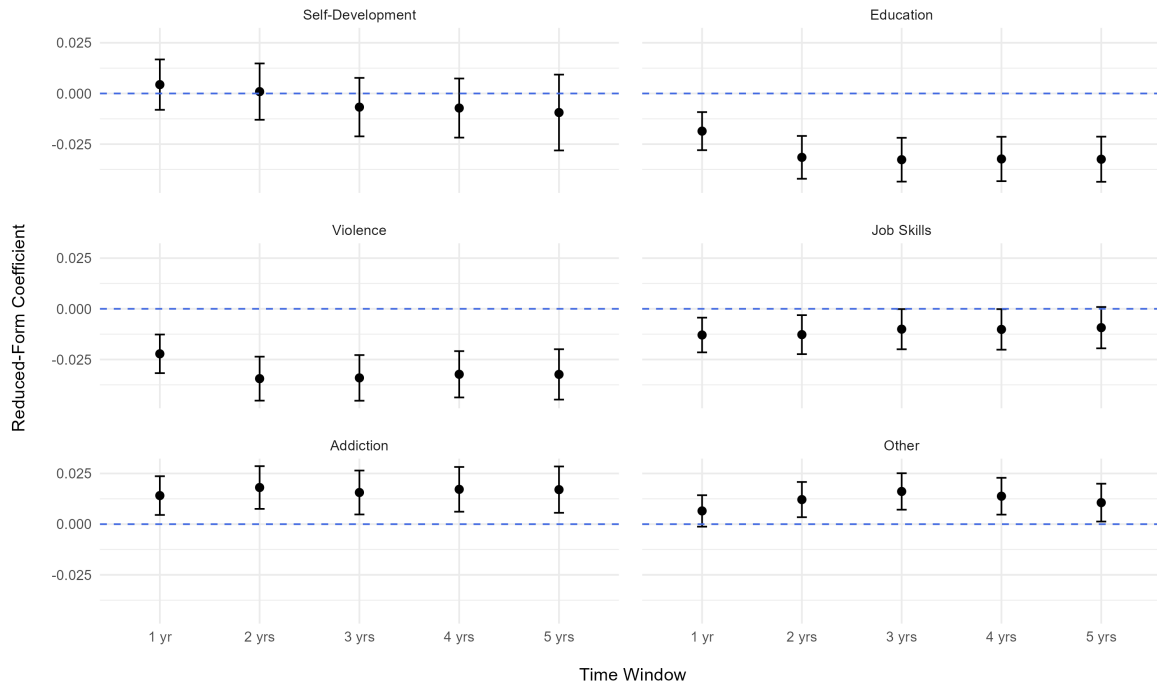


Figure A.3: Heterogeneity by Program Type—Joint Regressions

Notes: Coefficients are obtained with reduced-form regressions of the reincarceration outcome on the number of available programs of each category, standardized by their 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).

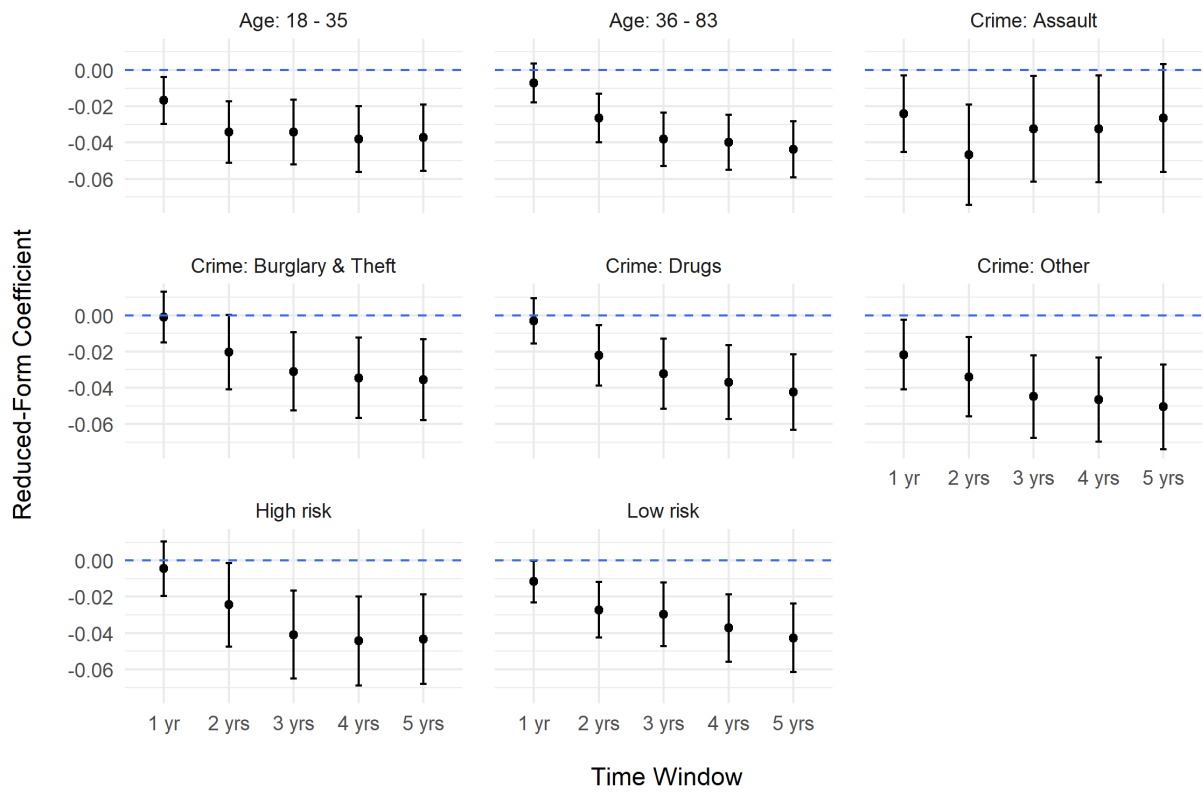


Figure A.4: Heterogeneity by Inmates' Characteristics

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 \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). The last two plots (*High risk* and *Low risk*) restrict the sample to inmates with risk scores.

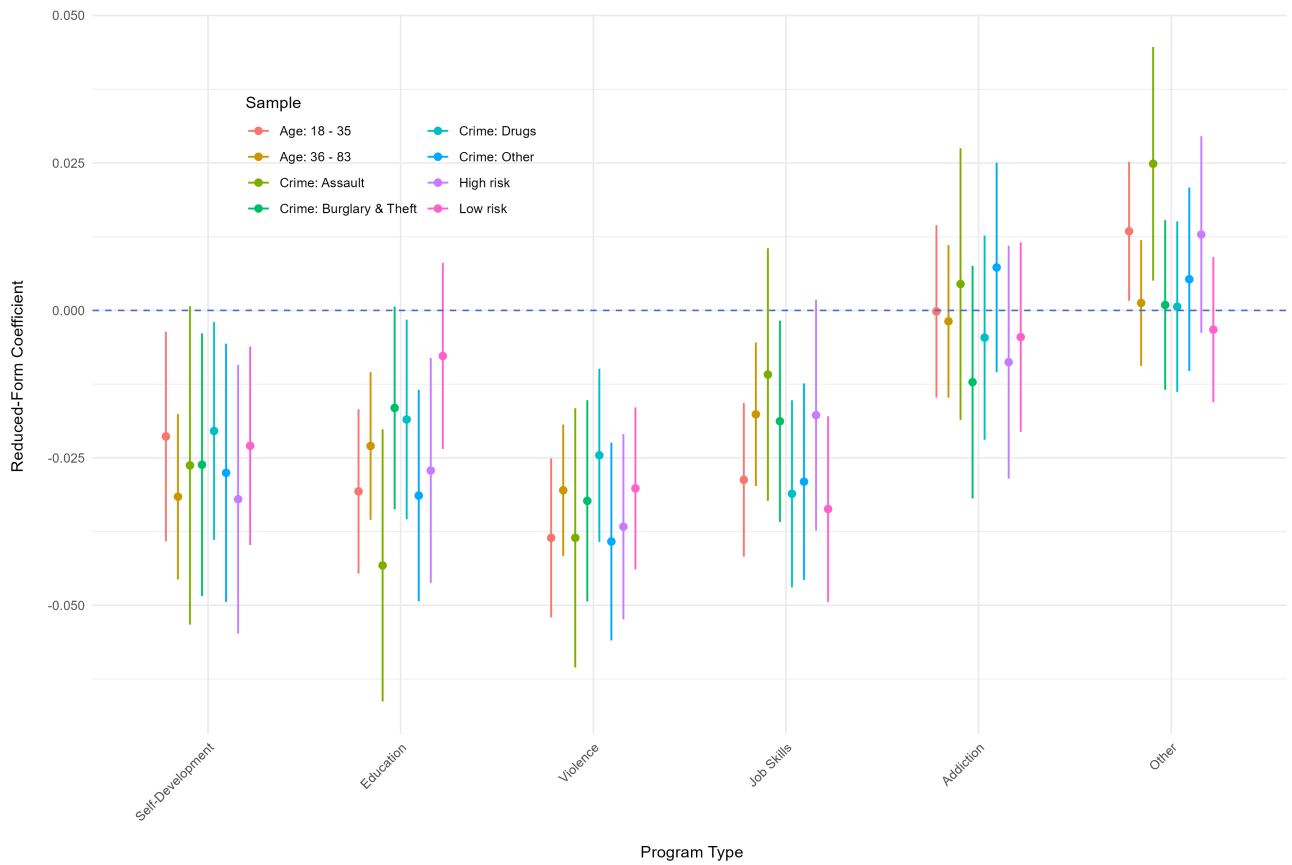


Figure A.5: Heterogeneity by Program Type and Characteristic

Notes: Each coefficient is obtained with a reduced-form regression on each subsample of interest of the reincarceration within three years outcome on the number of available programs of a given type, standardized by their standard deviations. 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).

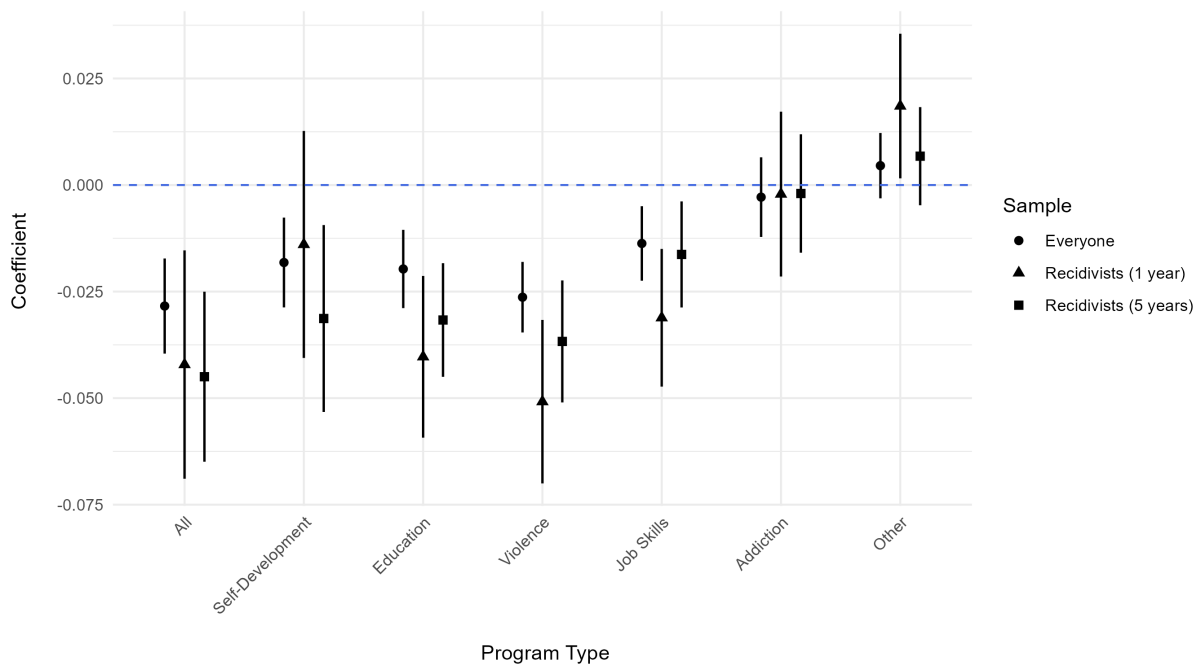


Figure A.6: Effect of Programs on Future Pretrial Detention

Notes: Each coefficient is obtained with a reduced-form regression on each subsample of interest of an indicator for pretrial detention during the next arrest on the number of available programs of a given type, standardized by their standard deviations. 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).

B Additional Tables

Table B.1: Supplementary Balance Checks

	(1) Crime: Other	(2) Crime: Assault	(3) Crime: Burglary & Theft	(4) Crime: Drugs
z_{ip}	-0.009 (0.007) [0.188] {0.743}	-0.007 (0.006) [0.225] {0.792}	-0.000 (0.007) [0.965] {1.000}	0.017** (0.007) [0.013] {0.198}
Observations	28907	28907	28907	28907
	(5) Age: [18-26]	(6) Age: [27-34]	(7) Age: [35-45]	(8) Age: [46 -]
z_{ip}	0.002 (0.007) [0.708] {1.000}	0.005 (0.007) [0.428] {0.950}	-0.003 (0.007) [0.705] {1.000}	-0.005 (0.007) [0.446] {0.990}
Observations	28907	28907	28907	28907
	(9) Indigenous	(10) Dependants	(11) Pre-trial det.	
z_{ip}	0.009** (0.004) [0.044] {0.406}	0.000 (0.002) [0.805] {1.000}	-0.004 (0.054) [0.946] {1.000}	
Observations	28907	28907	28907	

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The standard errors in parentheses are clustered at the prisoner level. The regular p-values are in brackets. The p-values adjusted for multiple hypothesis testing using the procedure of [Clarke et al. \(2020\)](#) are in braces. Each column regresses a characteristic on the instrument as suggested in [Pei et al. \(2019\)](#). All regressions include the set of randomization controls (prison- and year fixed effects, and the prison fixed effects \times sentence duration). z_{ip} is the number of programs available to an inmate during his incarceration, normalized by its standard deviation.

Table B.2: Effect of the number of programs on recidivism—Participants only

<i>Recidivism within...</i>	1 Year	2 Years	3 Years	4 Years	5 Years
Panel A—Recidivism: Provincial incarceration sentences					
<i>OLS</i>					
Num. of prog.	-0.002* (0.001)	-0.003** (0.002)	-0.004** (0.002)	-0.004** (0.002)	-0.004* (0.002)
<i>Reduced-Form</i>					
z_{ip}	-0.023** (0.010)	-0.033*** (0.011)	-0.034*** (0.012)	-0.036*** (0.012)	-0.030* (0.017)
<i>2SLS</i>					
Num. of prog.	-0.025** (0.012)	-0.035** (0.014)	-0.037** (0.014)	-0.039*** (0.015)	-0.041* (0.025)
Average of dep. var.	0.142	0.209	0.235	0.246	0.264
Panel B—Recidivism: Community sentences					
<i>OLS</i>					
Num. of prog.	0.000 (0.002)	-0.002 (0.002)	-0.004* (0.002)	-0.004* (0.002)	-0.005** (0.002)
<i>Reduced-Form</i>					
z_{ip}	0.017 (0.012)	0.025* (0.015)	0.040** (0.016)	0.026 (0.017)	0.004 (0.022)
<i>2SLS</i>					
Num. of prog.	0.019 (0.013)	0.027 (0.017)	0.043** (0.019)	0.028 (0.019)	0.005 (0.030)
Average of dep. var.	0.125	0.243	0.330	0.399	0.442
Panel C—Recidivism: Federal sentences					
<i>OLS</i>					
Num. of prog.	-0.001 (0.001)	-0.001 (0.001)	-0.000 (0.001)	-0.000 (0.001)	0.000 (0.001)
<i>Reduced-Form</i>					
z_{ip}	0.002 (0.005)	0.004 (0.006)	0.004 (0.007)	0.003 (0.007)	-0.001 (0.010)
<i>2SLS</i>					
Num. of prog.	0.002 (0.005)	0.005 (0.007)	0.004 (0.007)	0.003 (0.008)	-0.002 (0.014)
Average of dep. var.	0.020	0.034	0.044	0.050	0.053
Panel D—Recidivism: All sentences					
<i>OLS</i>					
Num. of prog.	-0.003 (0.002)	-0.006*** (0.002)	-0.006*** (0.002)	-0.005** (0.002)	-0.006** (0.002)
<i>Reduced-Form</i>					
z_{ip}	-0.003 (0.014)	0.002 (0.016)	0.021 (0.016)	0.010 (0.017)	-0.005 (0.021)
<i>2SLS</i>					
Num. of prog.	-0.004 (0.015)	0.003 (0.018)	0.023 (0.018)	0.011 (0.018)	-0.006 (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 \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). 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 B.3: Effect of the number of programs on recidivism—No additional controls

<i>Recidivism within...</i>	1 Year	2 Years	3 Years	4 Years	5 Years
Panel A—Recidivism: Provincial incarceration sentences					
<i>OLS</i>					
Num. of prog.	-0.007*** (0.001)	-0.010*** (0.001)	-0.010*** (0.002)	-0.011*** (0.002)	-0.012*** (0.002)
<i>Reduced-Form</i>					
z_{ip}	-0.024*** (0.005)	-0.038*** (0.006)	-0.041*** (0.006)	-0.040*** (0.006)	-0.046*** (0.007)
<i>2SLS</i>					
Num. of prog.	-0.040*** (0.009)	-0.062*** (0.011)	-0.066*** (0.011)	-0.066*** (0.011)	-0.077*** (0.013)
Average of dep. var.	0.217	0.300	0.338	0.357	0.373
Panel B—Recidivism: Community sentences					
<i>OLS</i>					
Num. of prog.	-0.004*** (0.001)	-0.006*** (0.002)	-0.009*** (0.002)	-0.010*** (0.002)	-0.011*** (0.002)
<i>Reduced-Form</i>					
z_{ip}	0.014** (0.006)	0.029*** (0.007)	0.027*** (0.008)	0.018** (0.008)	0.014 (0.009)
<i>2SLS</i>					
Num. of prog.	0.022** (0.010)	0.047*** (0.012)	0.044*** (0.013)	0.030** (0.013)	0.023 (0.015)
Average of dep. var.	0.157	0.265	0.345	0.406	0.450
Panel C—Recidivism: Federal sentences					
<i>OLS</i>					
Num. of prog.	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.000 (0.001)	-0.000 (0.001)
<i>Reduced-Form</i>					
z_{ip}	-0.002 (0.002)	-0.003 (0.003)	-0.003 (0.003)	-0.002 (0.003)	-0.003 (0.004)
<i>2SLS</i>					
Num. of prog.	-0.003 (0.004)	-0.004 (0.005)	-0.005 (0.005)	-0.003 (0.005)	-0.006 (0.006)
Average of dep. var.	0.014	0.023	0.029	0.032	0.034
Panel D—Recidivism: All sentences					
<i>OLS</i>					
Num. of prog.	-0.010*** (0.002)	-0.013*** (0.002)	-0.014*** (0.002)	-0.013*** (0.002)	-0.013*** (0.002)
<i>Reduced-Form</i>					
z_{ip}	-0.007 (0.007)	-0.006 (0.008)	-0.002 (0.008)	-0.004 (0.008)	-0.008 (0.009)
<i>2SLS</i>					
Num. of prog.	-0.012 (0.011)	-0.010 (0.012)	-0.003 (0.013)	-0.007 (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 B.4: Effect of the number of programs on recidivism—Offenders with risk scores

<i>Recidivism within...</i>	1 Year	2 Years	3 Years	4 Years	5 Years
Panel A—Recidivism: Provincial incarceration sentences					
<i>OLS</i>					
Num. of prog.	-0.004** (0.001)	-0.004** (0.002)	-0.005** (0.002)	-0.005*** (0.002)	-0.006*** (0.002)
<i>Reduced-Form</i>					
z_{ip}	-0.026*** (0.008)	-0.048*** (0.009)	-0.051*** (0.009)	-0.052*** (0.009)	-0.054*** (0.011)
<i>2SLS</i>					
Num. of prog.	-0.032*** (0.011)	-0.059*** (0.013)	-0.062*** (0.014)	-0.063*** (0.014)	-0.062*** (0.014)
Average of dep. var.	0.201	0.287	0.328	0.346	0.364
Panel B—Recidivism: Community sentences					
<i>OLS</i>					
Num. of prog.	-0.002 (0.002)	-0.003 (0.002)	-0.005** (0.002)	-0.005** (0.002)	-0.006*** (0.002)
<i>Reduced-Form</i>					
z_{ip}	0.015 (0.009)	0.031*** (0.011)	0.033*** (0.011)	0.022** (0.011)	0.015 (0.013)
<i>2SLS</i>					
Num. of prog.	0.018 (0.011)	0.037*** (0.014)	0.041*** (0.015)	0.027* (0.014)	0.018 (0.015)
Average of dep. var.	0.136	0.245	0.331	0.399	0.446
Panel C—Recidivism: Federal sentences					
<i>OLS</i>					
Num. of prog.	-0.001 (0.001)	-0.002** (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.000 (0.001)
<i>Reduced-Form</i>					
z_{ip}	-0.004 (0.004)	-0.004 (0.005)	-0.004 (0.005)	-0.005 (0.006)	-0.005 (0.006)
<i>2SLS</i>					
Num. of prog.	-0.005 (0.005)	-0.005 (0.006)	-0.005 (0.007)	-0.006 (0.007)	-0.005 (0.007)
Average of dep. var.	0.018	0.031	0.038	0.042	0.045
Panel D—Recidivism: All sentences					
<i>OLS</i>					
Num. of prog.	-0.005*** (0.002)	-0.007*** (0.002)	-0.007*** (0.002)	-0.007*** (0.002)	-0.007*** (0.002)
<i>Reduced-Form</i>					
z_{ip}	-0.009 (0.011)	-0.014 (0.011)	-0.003 (0.011)	-0.006 (0.011)	-0.010 (0.012)
<i>2SLS</i>					
Num. of prog.	-0.011 (0.013)	-0.017 (0.014)	-0.003 (0.014)	-0.007 (0.013)	-0.011 (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 \times 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 B.5: Effect of the number of programs on recidivism—Alternative cluster

<i>Recidivism within...</i>	1 Year	2 Years	3 Years	4 Years	5 Years
Panel A—Recidivism: Provincial incarceration sentences					
<i>OLS</i>					
Num. of prog.	-0.005*** (0.001)	-0.006*** (0.001)	-0.007*** (0.001)	-0.008*** (0.002)	-0.008*** (0.002)
<i>Reduced-Form</i>					
z_{ip}	-0.023*** (0.008)	-0.037*** (0.012)	-0.040*** (0.012)	-0.039*** (0.012)	-0.043*** (0.012)
<i>2SLS</i>					
Num. of prog.	-0.038*** (0.013)	-0.060*** (0.021)	-0.064*** (0.021)	-0.064*** (0.021)	-0.072*** (0.025)
Average of dep. var.	0.217	0.300	0.338	0.357	0.373
Panel B—Recidivism: Community sentences					
<i>OLS</i>					
Num. of prog.	-0.003** (0.001)	-0.004** (0.002)	-0.007*** (0.002)	-0.007*** (0.002)	-0.008*** (0.002)
<i>Reduced-Form</i>					
z_{ip}	0.014* (0.008)	0.030** (0.011)	0.028** (0.011)	0.019* (0.010)	0.017 (0.011)
<i>2SLS</i>					
Num. of prog.	0.023* (0.012)	0.048** (0.018)	0.045** (0.017)	0.031* (0.016)	0.028 (0.018)
Average of dep. var.	0.157	0.265	0.345	0.406	0.450
Panel C—Recidivism: Federal sentences					
<i>OLS</i>					
Num. of prog.	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.000 (0.001)	-0.000 (0.001)
<i>Reduced-Form</i>					
z_{ip}	-0.002 (0.002)	-0.002 (0.002)	-0.003 (0.003)	-0.002 (0.003)	-0.004 (0.003)
<i>2SLS</i>					
Num. of prog.	-0.003 (0.003)	-0.004 (0.004)	-0.004 (0.004)	-0.003 (0.005)	-0.006 (0.005)
Average of dep. var.	0.014	0.023	0.029	0.032	0.034
Panel D—Recidivism: All sentences					
<i>OLS</i>					
Num. of prog.	-0.007*** (0.002)	-0.010*** (0.002)	-0.010*** (0.002)	-0.009*** (0.002)	-0.009*** (0.002)
<i>Reduced-Form</i>					
z_{ip}	-0.006 (0.006)	-0.005 (0.008)	-0.000 (0.008)	-0.003 (0.007)	-0.004 (0.008)
<i>2SLS</i>					
Num. of prog.	-0.009 (0.009)	-0.008 (0.013)	-0.000 (0.013)	-0.005 (0.011)	-0.006 (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 \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). 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 B.6: Effect of the number of programs on recidivism—First observation per individual

<i>Recidivism within...</i>	1 Year	2 Years	3 Years	4 Years	5 Years
Panel A—Recidivism: Provincial incarceration sentences					
<i>OLS</i>					
Num. of prog.	-0.002 (0.001)	-0.005*** (0.001)	-0.006*** (0.001)	-0.007*** (0.001)	-0.008*** (0.002)
<i>Reduced-Form</i>					
z_{ip}	-0.016*** (0.005)	-0.029*** (0.006)	-0.032*** (0.007)	-0.032*** (0.007)	-0.037*** (0.008)
<i>2SLS</i>					
Num. of prog.	-0.024*** (0.009)	-0.045*** (0.011)	-0.048*** (0.011)	-0.049*** (0.011)	-0.062*** (0.015)
Average of dep. var.	0.156	0.232	0.269	0.288	0.304
Panel B—Recidivism: Community sentences					
<i>OLS</i>					
Num. of prog.	-0.001 (0.001)	-0.003** (0.002)	-0.006*** (0.002)	-0.006*** (0.002)	-0.008*** (0.002)
<i>Reduced-Form</i>					
z_{ip}	0.009 (0.006)	0.017** (0.008)	0.016* (0.008)	0.010 (0.009)	0.006 (0.010)
<i>2SLS</i>					
Num. of prog.	0.014 (0.009)	0.026** (0.012)	0.025* (0.013)	0.015 (0.014)	0.009 (0.017)
Average of dep. var.	0.120	0.208	0.276	0.333	0.376
Panel C—Recidivism: Federal sentences					
<i>OLS</i>					
Num. of prog.	-0.001 (0.001)	-0.001 (0.001)	-0.000 (0.001)	-0.000 (0.001)	0.000 (0.001)
<i>Reduced-Form</i>					
z_{ip}	-0.004 (0.003)	-0.004 (0.003)	-0.004 (0.004)	-0.003 (0.004)	-0.006 (0.005)
<i>2SLS</i>					
Num. of prog.	-0.007 (0.004)	-0.006 (0.005)	-0.006 (0.006)	-0.004 (0.006)	-0.010 (0.008)
Average of dep. var.	0.013	0.022	0.028	0.031	0.034
Panel D—Recidivism: All sentences					
<i>OLS</i>					
Num. of prog.	-0.004*** (0.002)	-0.009*** (0.002)	-0.009*** (0.002)	-0.008*** (0.002)	-0.009*** (0.002)
<i>Reduced-Form</i>					
z_{ip}	-0.008 (0.008)	-0.011 (0.009)	-0.007 (0.009)	-0.009 (0.009)	-0.013 (0.010)
<i>2SLS</i>					
Num. of prog.	-0.012 (0.012)	-0.018 (0.013)	-0.011 (0.014)	-0.014 (0.014)	-0.022 (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 \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). 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 B.7: Effect of the number of programs on recidivism—With month fixed-effects

<i>Recidivism within...</i>	1 Year	2 Years	3 Years	4 Years	5 Years
Panel A—Recidivism: Provincial incarceration sentences					
<i>OLS</i>					
Num. of prog.	-0.005*** (0.001)	-0.006*** (0.001)	-0.007*** (0.001)	-0.008*** (0.001)	-0.008*** (0.002)
<i>Reduced-Form</i>					
z_{ip}	-0.022*** (0.005)	-0.036*** (0.006)	-0.039*** (0.006)	-0.039*** (0.006)	-0.042*** (0.007)
<i>2SLS</i>					
Num. of prog.	-0.034*** (0.009)	-0.058*** (0.010)	-0.062*** (0.011)	-0.062*** (0.011)	-0.070*** (0.013)
Average of dep. var.	0.217	0.300	0.338	0.357	0.373
Panel B—Recidivism: Community sentences					
<i>OLS</i>					
Num. of prog.	-0.003** (0.001)	-0.004*** (0.002)	-0.007*** (0.002)	-0.007*** (0.002)	-0.008*** (0.002)
<i>Reduced-Form</i>					
z_{ip}	0.016*** (0.006)	0.033*** (0.007)	0.031*** (0.007)	0.022*** (0.007)	0.021** (0.009)
<i>2SLS</i>					
Num. of prog.	0.025*** (0.009)	0.053*** (0.012)	0.049*** (0.012)	0.035*** (0.012)	0.034** (0.015)
Average of dep. var.	0.157	0.265	0.345	0.406	0.450
Panel C—Recidivism: Federal sentences					
<i>OLS</i>					
Num. of prog.	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.000 (0.001)	-0.000 (0.001)
<i>Reduced-Form</i>					
z_{ip}	-0.002 (0.002)	-0.002 (0.003)	-0.003 (0.003)	-0.002 (0.003)	-0.004 (0.004)
<i>2SLS</i>					
Num. of prog.	-0.003 (0.004)	-0.004 (0.004)	-0.004 (0.005)	-0.004 (0.005)	-0.007 (0.006)
Average of dep. var.	0.014	0.023	0.029	0.032	0.034
Panel D—Recidivism: All sentences					
<i>OLS</i>					
Num. of prog.	-0.007*** (0.002)	-0.010*** (0.002)	-0.010*** (0.002)	-0.009*** (0.002)	-0.009*** (0.002)
<i>Reduced-Form</i>					
z_{ip}	-0.003 (0.007)	-0.001 (0.007)	0.003 (0.008)	-0.000 (0.007)	-0.001 (0.008)
<i>2SLS</i>					
Num. of prog.	-0.005 (0.011)	-0.002 (0.012)	0.004 (0.012)	-0.000 (0.012)	-0.002 (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 \times 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 B.8: Effect of the number of programs on recidivism—Alternative instrument definition

<i>Recidivism within...</i>	1 Year	2 Years	3 Years	4 Years	5 Years
Panel A—Recidivism: Provincial incarceration sentences					
<i>OLS</i>					
Num. of prog.	-0.006*** (0.001)	-0.008*** (0.001)	-0.008*** (0.001)	-0.009*** (0.002)	-0.009*** (0.002)
<i>Reduced-Form</i>					
z_{ip}	-0.023*** (0.005)	-0.037*** (0.006)	-0.040*** (0.006)	-0.039*** (0.006)	-0.043*** (0.007)
<i>2SLS</i>					
Num. of prog.	-0.035*** (0.008)	-0.056*** (0.009)	-0.059*** (0.010)	-0.059*** (0.010)	-0.068*** (0.012)
Average of dep. var.	0.217	0.300	0.338	0.357	0.373
Panel B—Recidivism: Community sentences					
<i>OLS</i>					
Num. of prog.	-0.004*** (0.001)	-0.007*** (0.002)	-0.009*** (0.002)	-0.010*** (0.002)	-0.010*** (0.002)
<i>Reduced-Form</i>					
z_{ip}	0.014** (0.006)	0.030*** (0.007)	0.028*** (0.007)	0.019** (0.007)	0.017* (0.008)
<i>2SLS</i>					
Num. of prog.	0.021** (0.009)	0.045*** (0.011)	0.042*** (0.012)	0.028** (0.011)	0.026* (0.014)
Average of dep. var.	0.157	0.265	0.345	0.406	0.450
Panel C—Recidivism: Federal sentences					
<i>OLS</i>					
Num. of prog.	-0.001 (0.001)	-0.001* (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
<i>Reduced-Form</i>					
z_{ip}	-0.002 (0.002)	-0.002 (0.003)	-0.003 (0.003)	-0.002 (0.003)	-0.004 (0.004)
<i>2SLS</i>					
Num. of prog.	-0.003 (0.003)	-0.004 (0.004)	-0.004 (0.004)	-0.003 (0.005)	-0.006 (0.006)
Average of dep. var.	0.014	0.023	0.029	0.032	0.034
Panel D—Recidivism: All sentences					
<i>OLS</i>					
Num. of prog.	-0.010*** (0.002)	-0.013*** (0.002)	-0.013*** (0.002)	-0.012*** (0.002)	-0.012*** (0.002)
<i>Reduced-Form</i>					
z_{ip}	-0.006 (0.007)	-0.005 (0.007)	-0.000 (0.007)	-0.003 (0.007)	-0.004 (0.008)
<i>2SLS</i>					
Num. of prog.	-0.008 (0.010)	-0.007 (0.011)	-0.000 (0.011)	-0.004 (0.011)	-0.006 (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 \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). 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 B.9: Effect of the number of programs on recidivism—Alternative definition (beginning of sentence)

<i>Recidivism within...</i>	1 Year	2 Years	3 Years	4 Years	5 Years
Panel A—Recidivism: Provincial incarceration sentences					
<i>OLS</i>					
Num. of prog.	-0.002*** (0.001)	-0.006*** (0.001)	-0.007*** (0.001)	-0.007*** (0.001)	-0.008*** (0.001)
<i>Reduced-Form</i>					
z_{ip}	-0.012*** (0.004)	-0.030*** (0.005)	-0.036*** (0.006)	-0.039*** (0.006)	-0.040*** (0.006)
<i>2SLS</i>					
Num. of prog.	-0.019*** (0.007)	-0.049*** (0.010)	-0.058*** (0.011)	-0.063*** (0.011)	-0.065*** (0.011)
Average of dep. var.	0.179	0.280	0.327	0.352	0.365
Panel B—Recidivism: Community sentences					
<i>OLS</i>					
Num. of prog.	-0.004*** (0.001)	-0.004*** (0.001)	-0.006*** (0.002)	-0.006*** (0.002)	-0.007*** (0.002)
<i>Reduced-Form</i>					
z_{ip}	-0.001 (0.004)	0.022*** (0.006)	0.025*** (0.007)	0.027*** (0.007)	0.019** (0.007)
<i>2SLS</i>					
Num. of prog.	-0.001 (0.007)	0.036*** (0.010)	0.040*** (0.012)	0.043*** (0.012)	0.031** (0.012)
Average of dep. var.	0.120	0.232	0.320	0.386	0.435
Panel C—Recidivism: Federal sentences					
<i>OLS</i>					
Num. of prog.	-0.001*** (0.000)	-0.000 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
<i>Reduced-Form</i>					
z_{ip}	-0.000 (0.001)	-0.003 (0.002)	-0.004 (0.003)	-0.002 (0.003)	-0.002 (0.003)
<i>2SLS</i>					
Num. of prog.	-0.000 (0.002)	-0.005 (0.004)	-0.006 (0.005)	-0.003 (0.005)	-0.003 (0.005)
Average of dep. var.	0.008	0.018	0.025	0.030	0.033
Panel D—Recidivism: All sentences					
<i>OLS</i>					
Num. of prog.	-0.006*** (0.001)	-0.009*** (0.002)	-0.010*** (0.002)	-0.009*** (0.002)	-0.009*** (0.002)
<i>Reduced-Form</i>					
z_{ip}	-0.006 (0.005)	-0.007 (0.007)	-0.005 (0.007)	0.002 (0.007)	-0.001 (0.007)
<i>2SLS</i>					
Num. of prog.	-0.010 (0.009)	-0.011 (0.011)	-0.007 (0.012)	0.004 (0.012)	-0.001 (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 \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). 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 B.10: Effect of the number of programs on recidivism—Alternative definition (release)

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

Table B.11: Effect of the number of programs on recidivism—Adding lagged value of instrument as control

<i>Recidivism within...</i>	1 Year	2 Years	3 Years	4 Years	5 Years
Panel A: Incarceration sentences					
<i>OLS</i>					
<i>Num. of prog.</i>	-0.011*** (0.003)	-0.006* (0.004)	-0.006* (0.004)	-0.005 (0.004)	-0.005 (0.004)
<i>Reduced-Form</i>					
z_{ip}	-0.037*** (0.012)	-0.048*** (0.012)	-0.051*** (0.012)	-0.050*** (0.012)	-0.048*** (0.014)
<i>2SLS</i>					
<i>Num. of prog.</i>	-0.067*** (0.023)	-0.086*** (0.025)	-0.092*** (0.026)	-0.090*** (0.026)	-0.082*** (0.025)
Average of dep. var.	0.358	0.456	0.496	0.516	0.533
Panel B: Community sentences					
<i>OLS</i>					
<i>Num. of prog.</i>	-0.004 (0.004)	-0.004 (0.004)	-0.005 (0.004)	-0.006 (0.004)	-0.003 (0.004)
<i>Reduced-Form</i>					
z_{ip}	0.019 (0.013)	0.049*** (0.014)	0.043*** (0.014)	0.027** (0.013)	0.031** (0.014)
<i>2SLS</i>					
<i>Num. of prog.</i>	0.034 (0.023)	0.089*** (0.028)	0.077*** (0.027)	0.049** (0.025)	0.052** (0.025)
Average of dep. var.	0.240	0.395	0.503	0.573	0.621
Panel C: Federal sentences					
<i>OLS</i>					
<i>Num. of prog.</i>	-0.001 (0.001)	-0.002 (0.002)	-0.002 (0.002)	-0.001 (0.002)	-0.002 (0.002)
<i>Reduced-Form</i>					
z_{ip}	0.002 (0.004)	-0.001 (0.005)	-0.002 (0.005)	-0.002 (0.005)	0.000 (0.006)
<i>2SLS</i>					
<i>Num. of prog.</i>	0.004 (0.007)	-0.002 (0.009)	-0.003 (0.009)	-0.003 (0.010)	0.001 (0.010)
Average of dep. var.	0.018	0.025	0.031	0.033	0.033
Panel D: All sentences					
<i>OLS</i>					
<i>Num. of prog.</i>	-0.013*** (0.004)	-0.008** (0.004)	-0.006* (0.003)	-0.006** (0.003)	-0.004 (0.003)
<i>Reduced-Form</i>					
z_{ip}	-0.005 (0.014)	0.002 (0.013)	0.006 (0.012)	0.001 (0.012)	0.010 (0.013)
<i>2SLS</i>					
<i>Num. of prog.</i>	-0.009 (0.025)	0.004 (0.024)	0.010 (0.023)	0.003 (0.022)	0.017 (0.022)
Average of dep. var.	0.523	0.678	0.754	0.791	0.816
Observations	8759	8759	8759	8755	8509

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All regressions use only observations for which we observe a past incarceration. 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 \times sentence duration), the lagged value of the instrument, 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.

C Cost-Benefit Analysis

This section describes a simple cost-benefit analysis of prison programs by type of program and individual characteristics. The daily cost of incarceration stands at \$254, with an average sentence duration of 116 days. In contrast, community sentences cost \$49 per day but extend over an average of 280 days ([Parliamentary Budget Officer, 2018](#)).

In evaluating the benefits of prison programs, let β represent the effect of program availability on the rate of provincial incarceration, as estimated by our reduced-form estimations. We assume that this effect arises from a transition from incarceration to community sentences. Then the estimated financial benefit of these programs per participant on incarceration costs is given by the expression $\hat{\beta} \times (\$254 \times 116 - \$49 \times 280)$ divided by the proportion of participants.

When considering the costs associated with these programs, the primary expense is the salaries of the counselors. A significant variable in our calculation is the size of the groups receiving the programs, as this number fluctuates depending on the type of program. Additionally, the programs vary in length. For the sake of analysis, we assume a counselor's annual salary is \$77,620, based on a 40-hour workweek over 50 weeks per year. This calculation leads to an hourly wage of \$39.50.¹ Consequently, the cost of delivering a program is this hourly wage multiplied by the number of hours required for the specific type of program.²

The results by program type are displayed in Table C.1. These estimations use our reduced-form estimates of the effect of program availability within five years from Figure A.3 as $\hat{\beta}$. We estimate that the average program yield a benefit-to-cost ratio of 3.83. Consistent with the heterogeneity of program impacts, our results show that programs targeting violence and job skills yield the highest benefit-to-cost ratios. On the other hand, programs categorized under addiction and *other* show no benefits.

Table C.2 presents an estimation using our reduced-form estimates of the effect of program

¹See [Government of Canada \(2023\)](#) for the distribution of salaries of correctional officers across regions in 2021-2022. All the costs in the section are expressed in 2018 Canadian dollars ([Bank of Canada, 2023](#)).

²Based on a document providing summary information for all programs, we determined the average duration and frequency of each program type, allowing us to calculate the total annual hours dedicated to program delivery. The document listed a comprehensive inventory of programs, activities, and services offered to offenders in all the correctional facilities across Quebec in 2015. For a small proportion of programs, the document indicates the number of sessions, the duration of each as well as an average number of participants. We averaged these parameters within each program type across the seven facilities in our sample. Access to the inventory is contingent upon authorization from the Ministry.

Table C.1: Cost-Benefit Analysis by Program Type

Program Type	Benefits (\pm margin)	Group size	Duration (hours)	Costs	Ratio (\pm margin)
Any	320.52 (\pm 106.29)	13	28	83.59	3.83 (\pm 1.27)
Violence	12021.80 (\pm 3968.27)	5	30	232.86	51.63 (\pm 17.04)
Addiction	-308.07 (\pm 2766.09)	16	29	70.34	-4.38 (\pm 39.32)
Self-Development	990.99 (\pm 608.22)	10	31	120.31	8.24 (\pm 5.06)
Other	-147.98 (\pm 1349.15)	11	8	28.23	-5.24 (\pm 47.80)
Education	2278.52 (\pm 763.76)	20	220	426.91	5.34 (\pm 1.79)
Job Skills	6869.10 (\pm 3080.36)	25	420	652.01	10.54 (\pm 4.72)

Notes: Participant benefits are derived using reduced-form regression for each program type. Costs are based on counselors' salaries, group sizes, and program durations. The benefits and costs are expressed per participant. Values in parentheses represent 95% confidence intervals.

availability within five years from Figure A.4 as $\hat{\beta}$. As we have no information on differential duration or group size by characteristics of participants, the estimated costs of programs remain constant across characteristics. The results reveal limited variation in the efficiency of prison programs based on crime type, age, risk level, and sentence duration. For instance, in terms of age, older inmates (36-83) slightly outperform the younger group, while high-risk inmates marginally benefit more from these programs compared to their low-risk counterparts. Most notably, shorter sentence durations yield higher cost-benefit ratios, suggesting greater efficiency in brief interventions.

Table C.2: Cost-Benefit Analysis by Characteristic

Subset	Benefits (\pm margin)	Costs	Ratio (\pm margin)
Crime: Other	411.53 (\pm 206.36)	83.59	4.92 (\pm 2.47)
Crime: Assault	229.92 (\pm 267.22)	83.59	2.75 (\pm 3.20)
Crime: Burglary & Theft	243.73 (\pm 203.86)	83.59	2.92 (\pm 2.44)
Crime: Drugs	378.96 (\pm 186.00)	83.59	4.53 (\pm 2.23)
Age: 18 - 35	307.86 (\pm 159.44)	83.59	3.68 (\pm 1.91)
Age: 36 - 83	326.17 (\pm 141.96)	83.59	3.90 (\pm 1.70)
Low risk	301.21 (\pm 121.26)	83.59	3.60 (\pm 1.45)
High risk	344.62 (\pm 129.49)	83.59	4.12 (\pm 1.55)
Sentence duration: 7 - 33 days	644.28 (\pm 292.78)	83.59	7.71 (\pm 3.50)
Sentence duration: 34 - 111 days	513.45 (\pm 259.89)	83.59	6.14 (\pm 3.11)
Sentence duration: 112 - 779 days	126.09 (\pm 127.97)	83.59	1.51 (\pm 1.53)

Notes: Participant benefits are derived using reduced-form regression for each characteristic. Costs are based on counselors' salaries, group sizes, and program durations. The benefits and costs are expressed per participant. Values in parentheses represent 95% confidence intervals.