

Online Appendix
to
“How Does Visitation Affect Incarcerated Persons and Their
Families? Estimates Using Exogenous Variation in Visits Driven by
Distance between Home and Prison”

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A. Appendix Tables and Figures

Table A1

Effect of Number of Visits per Month on Incarcerated Persons, Partner, and Child Outcomes. Results from 2SLS models

Outcome	95% CI of Effect of Number of Visits	Sample Mean (SD)	Mean for Incarcerated Persons with No Visitation (SD)	N
Incarcerated Persons				
No. of solitary disciplinary sanctions per month	-0.02:0.01	0.04 (0.15)	0.03 (0.17)	25,573 ^a
No. of non-solitary conditional disciplinary sanctions per month	-0.00:0.03	0.05 (0.17)	0.04 (0.19)	25,573 ^a
No. of non-solitary disciplinary sanctions per month (fines)	-0.00:0.08	0.26 (0.54)	0.23 (0.64)	25,573 ^a
No. of non-solitary disciplinary sanctions per month (warnings)	0.00:0.05*	0.09 (0.27)	0.07 (0.32)	25,573 ^a
No. of leaves per month	-0.06:0.28	1.85 (2.25)	1.26 (1.77)	25,573 ^a
Total hours of leave per month	-1.86:4.25	38.55 (40.47)	29.24 (39.03)	25,573 ^a
Length of total leaves relative to sentence length	-0.00:0.01	0.05 (0.06)	0.04 (0.06)	25,573 ^a
No. weekend leaves per month	-0.02:0.07	0.58 (0.62)	0.43 (0.60)	25,573 ^a
Total hours weekend leave	-1.32:3.81	30.96 (34.09)	23.34 (32.87)	25,573 ^a
Total length of weekend leaves relative to sentence length	-0.00:0.01	0.04 (0.05)	0.03 (0.05)	25,573 ^a
Early release on parole	0.00:0.08*	0.59 (0.49)	0.57 (0.50)	25,573 ^a
Singlehood	-0.02:0.04	0.79 (0.40)	0.83 (0.38)	25,573 ^a
Re-partnering	-0.02:0.07	0.05 (0.22)	0.04 (0.20)	4,799 ^b
No. of residential moves	-0.10:0.08	2.02 (1.19)	1.92 (1.15)	25,573 ^a
Labor earnings (2010 PPP USD)	-0.02:0.20	0.98 (1.75)	0.96 (1.75)	25,573 ^a
Employment (labor earnings > 0)	-0.01:0.05	0.43 (0.49)	0.42 (0.49)	25,573 ^a
Employed on last day of November	-0.01:0.05	0.31 (0.46)	0.30 (0.46)	25,573 ^a
Employed at any point	-0.04:0.04	0.32 (0.47)	0.26 (0.44)	15,605 ^c
Reconvicted within 2 years	-0.04:0.04	0.38 (0.48)	0.37 (0.48)	25,573 ^a
Rearrested within 2 years	-0.04:0.03	0.46 (0.50)	0.43 (0.50)	25,573 ^a
New prison sentence within 2 years	-0.05:0.00	0.16 (0.36)	0.14 (0.35)	25,573 ^a
Psychiatric treatment within 1 year	-0.01:0.02	0.05 (0.21)	0.05 (0.21)	25,573 ^a

Psychiatric treatment within 2 years	−0.01:0.04	0.08 (0.27)	0.07 (0.26)	25,573 ^a
Partner				
No. of residential moves	−0.29:0.11	1.89 (1.13)	1.74 (1.05)	4,799 ^d
Labor earnings (2010 PPP USD)	−0.42:0.25	1.61 (1.95)	1.63 (1.98)	4,799 ^d
Employment (labor earnings > 0)	−0.12:0.05	0.58 (0.49)	0.56 (0.50)	4,799 ^d
Employed on last day of November	−0.14:0.05	0.49 (0.50)	0.50 (0.50)	4,799 ^d
Psychiatric treatment within 1 year	−0.03:0.04	0.04 (0.20)	0.04 (0.20)	4,799 ^d
Psychiatric treatment within 2 years	−0.05:0.04	0.07 (0.25)	0.06 (0.24)	4,799 ^d
Sickness leave within 1 year	−0.05:0.08	0.16 (0.37)	0.15 (0.36)	4,799 ^d
Sickness leave within 2 years	−0.04:0.12	0.25 (0.43)	0.23 (0.42)	4,799 ^d
No. weeks on sick leave within 1 year / 52	−0.02:0.03	0.04 (0.14)	0.04 (0.15)	4,799 ^d
No. weeks on sick leave within 2 years / 104	−0.02:0.03	0.04 (0.13)	0.04 (0.13)	4,799 ^d
Children				
Household income < 50% of median	−0.04:0.08	0.24 (0.43)	0.22 (0.41)	5,451 ^e
Authorized school absence within 3 months	−0.04:0.01	0.04 (0.04)	0.04 (0.04)	1,113 ^f
Unauthorized school absence within 3 months	−0.01:0.02	0.01 (0.03)	0.01 (0.03)	1,113 ^f
Total school absence within 3 months	−0.03:0.01	0.05 (0.06)	0.05 (0.05)	1,113 ^f
Juvenile charge within 2 years	−0.09:0.07	0.09 (0.29)	0.11 (0.31)	2,553 ^g
Math test score	−0.15:0.34	−0.60 (1.03)	−0.64 (1.05)	4,326 ^h
In bottom 5% of math test scores	−0.11:0.05	0.13 (0.34)	0.14 (0.35)	4,326 ^h
Danish test score	−0.03:0.34	−0.53 (1.11)	−0.54 (1.13)	5,400 ⁱ
In bottom 5% of Danish test scores	−0.04:0.06	0.13 (0.34)	0.13 (0.34)	5,400 ⁱ

Source: Own calculations on data from Statistics Denmark and the Danish Prison and Probation Service.

a Full sample. b Incarcerated persons with partners. c Incarcerated persons with formal employment, 2008–2014. d Cohabiting or married partners (at admission) of the incarcerated persons in the full sample. e All children of the incarcerated persons in the full sample. f Children aged 6–15 at admission who appear in the school absence register, 2011–2014. g Children aged 11–15 at incarcerated person's admission. h Children who completed at least one national test in mathematics. i Children who completed at least one national test in Danish. Standard errors in parentheses.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (two-tailed tests).

Table A2

Effect of Number of Visits per Month on Outcome Summary Indices. Results from 2SLS models

Outcome	95% CI of Effect of Number of Visits	Sample Mean (SD)	Mean for Incarcerated Persons with No Visitation (SD)	<i>N</i>
Incarcerated person outcomes during imprisonment (index)	-0.04:0.05	0.00 (0.59)	-0.11 (0.56)	25,573
Incarcerated person outcomes after release (index)	-0.02:0.04	0.00 (0.49)	0.01 (0.48)	25,573
Partner outcomes (index)	-0.12:0.06	0.00 (0.50)	0.02 (0.50)	4,799
Children's outcomes (index)	-0.10:0.09	-0.02 (0.74)	0.00 (0.73)	7,272

Source: Own calculations on data from Statistics Denmark and the Danish Prison and Probation Service.

Notes: Outcome summary indices calculated as proposed in Hoynes, Hilary, Diane W. Schanzenbach, and Douglas Almond. 2016. "Long-Run Impacts of Childhood Access to the Safety Net." *American Economic Review* 106(4):903-34. We calculated the effect size for each outcome variable within indices from the mean and standard deviation of the outcome variable among incarcerated persons who were placed in the relevant prison that was closest to their home (i.e., the closest prison was below capacity when they were assigned to prison).

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (two-tailed tests).

Appendix Table A3

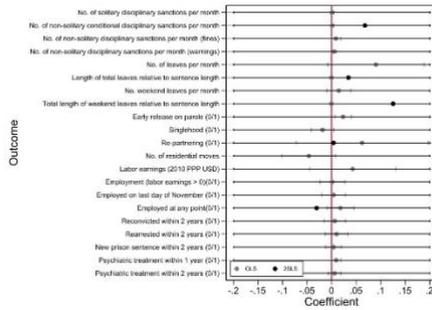
Results Summary of Robustness Check of First Stage Estimation of Distance from Home on Distance to Nearest Relevant Prison with an Opening

Time of opening measured	Actual Distance from Home					
	2 years earlier	1 year earlier	Main results	1 year later	2 years later	Random
Distance to nearest relevant prison with an opening (in 25 km)	0.030** (0.010)	0.027* (0.011)	0.520*** (0.017)	0.039** (0.012)	0.016 (0.012)	-0.005 (0.010)
F-test	8	6	893***	11	2	< 1
Observations	25,573	25,573	25,573	25,573	25,573	25,573
Police Jurisdiction Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Month-by-Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Covariates	Yes	Yes	Yes	Yes	Yes	Yes

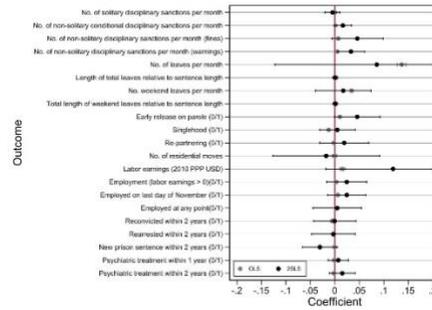
Source: Own calculations on data from Statistics Denmark and the Danish Prison and Probation Service.

Note: Table summarizes our main first stage results and the results from several robustness checks that use occupancy rates at the nearest relevant prison at times not related to the time when the prisoner was assigned. ‘Random’ refers to results that use the occupancy rate at the nearest relevant prison at a randomly chosen date within our observation window. For columns ‘x years earlier/later’, we expanded the data periods in which we observe occupancy rates to maintain sample size.

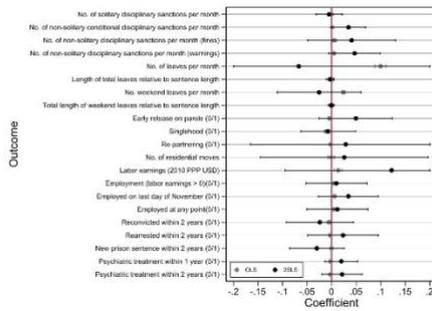
Panel A. Sentence length > 5 years



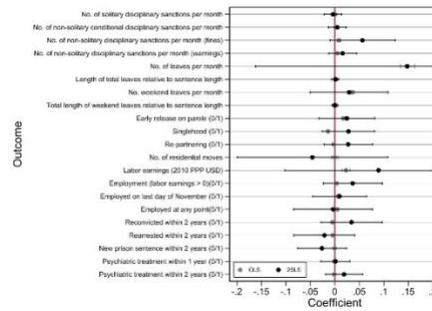
Panel B. Sentence length <= 5 years



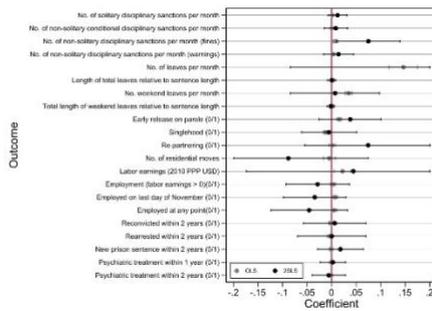
Panel C. Below median sentence length



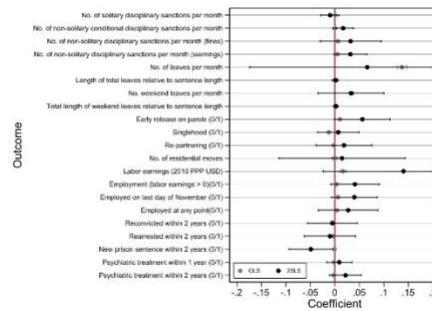
Panel D. Above median sentence length



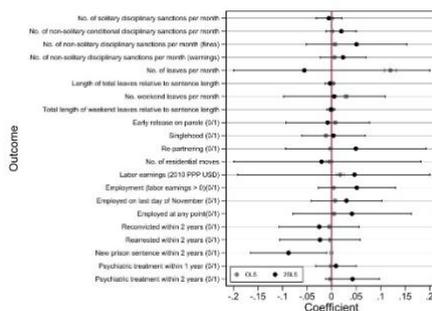
Panel E. Drug crimes



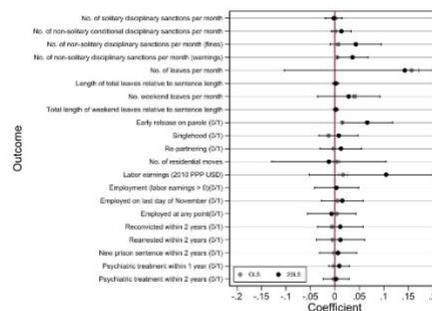
Panel F. Non-drug crimes



Panel G. Violent crimes



Panel H. Non-violent crimes



Appendix Figure 1

Effect of visitation on prisoner outcomes during and following release, by case characteristics

Notes: The figure shows parameter estimates and 95% confidence intervals from OLS and 2SLS models as defined in the Method section, by case characteristics. Confidence intervals capped to the [-.2 : .2] interval to ease readability, and only point estimates in this interval shown.

B. Additional Details on Data and Variables

In this section, we provide additional details on our data, control variables, and outcomes, including the data sources from which they were obtained.

B.I. From Raw Data to Analytical Sample

The raw data, which we received from the Danish Prison and Probation Service (DPPS), contained detailed information on each individual-by-facility spell of incarceration, obtained from the DPPS's national case management system. To arrive at our analytical sample, which for each sentence includes one observation for the incarcerated person's first assignment to an open or closed prison (admission and release during 2004-2014), we took a number of data steps which reduced the raw data. Table B1 summarizes these data steps and reports the progression of our data size (total number of observations; number of unique incarcerated persons; number of unique incarceration spells). Our final analytical sample included 25,571 observations (spells) on 20,603 individual incarcerated persons. In addition to these data, which we used to define our analytical sample of incarcerated persons, we also received data on all visits (including the identification numbers of visitors) that they experienced during confinement, as explained in detail in the main text.

Table B1

Data Steps and Observations Counts from Raw Data to Analytical Sample

Data Step	N	Unique incarcerated persons	Unique spells
Raw data from DPPS	334,637	83,827	130,346
Drop full duplicates	334,605	83,827	130,346
Keep spells with admission and release during 2000-2015 ¹	326,775	81,461	127,442
Drop invalid identification numbers	311,543	73,133	118,308
Drop cases with reversed dates	310,137	72,896	117,761
Keep only relevant variables and drop duplicates on these	216,470	72,896	117,671
Drop spells served in local jails	181,558	57,371	87,778
Drop all spells for people placed in long-term court-ordered treatment (“Anstalten ved Herstedvester”) ²	172,748	56,034	85,893
Drop if first assignment is transit prison (“Midtjyllands Fængsel”)	123,357	37,006	52,939
Keep only first observation per individual per case	52,936	37,004	52,936
Keep if admission and release during 2004-2014 ³	36,803	26,885	36,803
Drop if spells share admission date for the same individual	36,794	26,885	36,794
Drop observations with extreme values on instrument and arrive at analytical sample ⁴	25,573	20,603	25,573

Source: Own calculations on data from Statistics Denmark and the Danish Prison and Probation Service.

1 Some cases in the raw data file fell outside the requested data window; we ignore these.

2 We drop all cases for individuals who at some point enter the institution for long-term court-ordered treatment. Incarcerated persons placed here have severe mental issues and are often held in indefinite captivity, and they are not representative of incarcerated persons in general in Denmark.

3 The distribution of cases across time reveals anomalies prior to 2004 and we therefore focus only on admissions from January 1st, 2005. And although we have admissions in 2015, only few incarcerated persons admitted during 2015 have been release by December 31 that year, and we therefore drop cases from 2015.

4 See section D of this appendix.

B.II. Control Variables

By merging standard Danish register data onto our data from the DPPS, we obtain our control variables. We measure all control variables prior to admission into prison to avoid them being affected by imprisonment. We list the control variables by the type of registers they are based on, and we summarize their distribution by visitation status here.

B.II.A. Population registers.

We obtain date of birth, which is recorded from birth certificates. Combining date of birth with admission dates gives us age at admission (measured in years and entering our analyses as a continuous variable). We include a dummy variable for females. For marital status, we use information on legal civil status and dates of any changes herein; we distinguish between individuals who were married, cohabiting but unmarried, or unmarried and not living with a partner just before admission into prison. A set of dummy variables define number of children (0, 1, 2, 3, 4, or 5+ children) that the individual is recorded as being the parent of (again based on birth certificates). As a last piece of demographic information, we mark non-western ethnic minority backgrounds (1 = “Yes”, 0 = “No”), defined as whether the individual or both of his/her parents migrated to Denmark from a country not on the list of “western” countries (the EU28 countries, Andorra, Iceland, Liechtenstein, Monaco, Norway, San Marino, Switzerland, the Vatican, Canada, the United States of America, Australia, and New Zealand).

B.II.B. Education registers

The Ministry of Education records the educational credentials of the population and reports these to Statistics Denmark. We rely on the ministry’s definition of length (in years) of highest education attained. Tuition fees are tax covered in Denmark and from age 18, students get a public stipend for being enrolled in education. Denmark has 10 years of mandatory schooling but final exams in elementary schools are not mandatory, which causes some people to be recorded with fewer or no years of education. In our data, we mark such individuals with missing length of education with a dummy variable.

B.II.C. Labor market registers

We rely on two sources of information to define control variables related to the labor market. First, the Ministry of Employment reports each resident's labor market status on the last day of November each year to Statistics Denmark, following the International Labour Organisation's (ILO) standards to secure comparability across countries. Labor market status consists of three mutually exclusive categories: employed (holds a job), unemployed (does not hold a job but is required to look for one), and not in the workforce (does not hold a job and is not required to look for one because of, for example, social pension). We use the latest recorded labor market status prior to admission to prison. Second, the Danish Customs and Tax Administration reports all legal income to Statistics Denmark, and to gauge labor market performance (in addition to the November measures of labor market status), we control for labor wages earned during the year before admission to prison (in 2010 Purchasing Power Parity [PPP] adjusted Dollars, using OECD's individual consumption PPP-adjustment). In Denmark, all income is full third-party reported to the Danish Customs and Tax Administration, and employers are required to report salaries, fringes, bonuses, severance pays, board fees, stock options, salaries during leave, and even non-taxable salaries directly to the tax authorities. The earnings measure thus includes any income from legal labor work.

B.II.D. Criminal justice registers

The DPPS and the Danish National Police report several criminal justice variables to Statistics Denmark. Cases have unique identification numbers, and individuals are matched to cases using their personal identification number, allowing us to merge a range of case and individual information (charges, convictions, sentences, incarcerations). We distinguish between

information related to the case for which a person serves the prison sentence in our data, and prior criminal history. Concerning the current case, we include sentence length (in years) and a set of dummy variables for crime type (violent crime, property crime, drug crimes, and a residual “other crimes” category). Concerning criminal history, we include a dummy for whether the person had previously been incarcerated and the person’s number of previous convictions (dummy coded: 1, 2, 3, 4, 5+ prior convictions).

B.II.E. Local measures (at admission)

We include three measures of the local constraints which the person and his or her family members are exposed to, all measured as rates per 10,000 in the population of 15-65-year-old persons in the police jurisdiction during the month when the focal person was admitted to prison. The local admission rate relies on the incarcerations register and measures the number of people in that jurisdiction who were admitted to prison. The local crime rate relies on the crime reports register and measures the number of reported crimes during the month of admission. The local unemployment rate relies on the DREAM register, which consists of official records of weekly social benefit receipt, as compiled from data from the Danish Ministry of Employment, The Danish Ministry of Education, and the Danish Customs and Tax Administration. The DREAM register records the primary type of public benefit a person receives each week, which allows us to single out benefits related to unemployment and active labor market program participation. We count as unemployed everyone who received these types of benefits for at least one week during the month the focal person was admitted to prison.

B.II.F. Control variable distributions

Table B2 shows descriptive statistics of the control variables across incarcerated persons who receive visitation during imprisonment and incarcerated persons who do not. Disregarding visitation status, few incarcerated persons are females and about one in five have ethnic minority backgrounds. A large proportion is single and around 80 percent do not have children, which reflects the relatively low average age at admission (just above 30 years). And as one might expect, the incarcerated persons have low education (corresponding to just above mandatory schooling on average) and only one in three had a job prior to admission; the proportion outside the labor market (for example, on social pensions) is also high. Around half the incarcerated persons serve a prison sentence for violent crimes, more than half were previously incarcerated, and a low proportion had no prior convictions.

Comparing the control variable distributions across visitation status shows that the group of never visited incarcerated persons consist of a higher share of females, a higher share of singles, and a higher share with minority backgrounds. They have fewer average years of education and lower employment (which is counterbalanced by even more outside the labor force). Also, their average labor earnings are lower. In terms of criminal justice characteristics, the main difference between the groups is that those without any visitation tend to serve shorter sentences on average. In conclusion, although the incarcerated persons in general fare poor across the control variables, those who are never visited in prison constitutes an even more negatively selected group.

Table B2

Descriptive Statistics of Control Variables, by Visitation Status.

	Visited		Never Visited		Difference
	Mean	(SD)	Mean	(SD)	
Demographic registers					
Age at admission (years)	31.04	(10.17)	34.13	(11.38)	3.10***
Female	0.06	(0.25)	0.11	(0.31)	0.04***
Married	0.14	(0.35)	0.13	(0.33)	-0.02***
Cohabiting	0.18	(0.38)	0.13	(0.33)	-0.05***
Single	0.68	(0.47)	0.74	(0.44)	0.06***
No. of children = 0	0.80	(0.40)	0.82	(0.38)	0.02***
No. of children = 1	0.11	(0.31)	0.08	(0.28)	-0.02***
No. of children = 2	0.06	(0.23)	0.06	(0.23)	-0.00*
No. of children = 3	0.02	(0.14)	0.02	(0.15)	0.00*
No. of children = 4	0.01	(0.09)	0.01	(0.10)	0.00*
No. of children = 5+	0.00	(0.06)	0.01	(0.07)	0.00*
Non-western minority backgrounds	0.16	(0.37)	0.20	(0.40)	0.04***
Education registers					
Education (years)	9.39	(3.17)	9.20	(3.42)	-0.19***
Missing education	0.07	(0.26)	0.09	(0.28)	0.01***
Labor market registers					
Employed	0.31	(0.46)	0.28	(0.45)	-0.03***
Unemployed	0.10	(0.30)	0.10	(0.29)	-0.01*
Not in workforce	0.59	(0.49)	0.63	(0.48)	0.03***
Wage income (2010 PPP USD)	9,322	(17,201)	8,306	(15,768)	-1,015***
Criminal justice registers					
Sentence length (years)	1.11	(1.48)	0.49	(0.69)	-0.61***
Crime type = violence	0.53	(0.50)	0.47	(0.50)	-0.06***
Crime type = drugs	0.16	(0.37)	0.12	(0.32)	-0.04***
Crime type = property	0.16	(0.36)	0.18	(0.38)	0.02***
Crime type = other	0.15	(0.36)	0.23	(0.42)	0.08***
Previously incarcerated	0.64	(0.48)	0.61	(0.49)	-0.02***
No. of prev. convictions = 0	0.13	(0.34)	0.17	(0.38)	0.04***
No. of prev. convictions = 1	0.13	(0.34)	0.13	(0.33)	-0.01*
No. of prev. convictions = 2	0.12	(0.32)	0.11	(0.32)	-0.00*
No. of prev. convictions = 3	0.10	(0.30)	0.09	(0.28)	-0.01**
No. of prev. convictions = 4	0.09	(0.28)	0.07	(0.26)	-0.01***
No. of prev. convictions = 5+	0.43	(0.50)	0.43	(0.50)	-0.00*
Local measures (at admission)					
Local admission rate	2.42	(0.60)	2.53	(0.65)	0.11***
Local crime rate	100.46	(25.50)	104.55	(29.79)	4.09***
Local unemployment rate	634.57	(173.64)	664.26	(165.44)	29.70***
Observations	15,053		10,520		

Source: Own calculations on data from Statistics Denmark and the Danish Prison and Probation Service.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (two-tailed tests).

B.III. Outcome Variables

We describe the outcome variables by whether they refer to the incarcerated individual or his or her visiting partner or children. For incarcerated individuals, we split the description by whether the outcomes concern the period a person is confined (based on the dataset from the DPPS, which included visitation information), or whether they concern the post release period (based on standard register data available from Statistics Denmark). Following the variable descriptions, we summarize their distribution by visitation status.

B.III.A. Incarcerated persons' outcomes during confinement

The dataset from the DPPS contains measures related to conditions of confinement and in-prison conduct during each confinement spell in our data window. We use these to measure the potential effect of visitation on in-prison outcomes; for many of these, we measure the average of the outcome per month of incarceration to take differences in incarceration length into account. We include *disciplinary actions*. In Denmark, there are no supermax prisons in which solitary confinement are part of the punishment, and solitary confinement in punishment cell is instead considered the harshest disciplinary sanction an incarcerated person can endure for in-prison misconduct. Other than punishment cell placement, incarcerated persons may be recorded as having experienced three types of disciplinary actions, namely conditional punishment cell, fines, and official warnings. We construct four variables measuring the average number of each

of these disciplinary sanctions that an incarcerated person has experienced per month of incarceration. We also include access to *leave from prison*. In Denmark, prisoners can apply for leave from prison. In closed prisons the leave is under strict surveillance by an officer and is relatively rare. In open prisons, leave is unsupervised if circumstances permit it and weekend leave is common. Leave is typically granted to visit family, to maintain ties with an employer, or to pursue education that is unavailable in the prison. We include average number of leaves per month, total hours of leave per month, and the total length of granted leave relative to sentence length. We also include information specifically on weekend leave; average number of weekend leaves per month, total hours of weekend leave per month, and total length of weekend leave relative to sentence length. Last, we include a dummy variable for whether the incarcerated person achieved *early release on parole*, an indication of good in-prison behavior.

B.III.B. Incarcerated person outcomes after release

The post release outcomes are all based on standard register data. Most of the registers which we rely on here were described above, under Section B.II. We therefore simply mention these sources here and do not explain them in detail; we do provide detail on sources that were not described above. From the population registers we obtain *relationship status* using two variables. Singlehood is a dummy variable indicating whether the incarcerated person, post release, is unmarried and not cohabiting with a partner. Re-partnering is a dummy variable indicating whether the incarcerated people who had a romantic partner prior to admission (that is, was married or cohabiting) have found a new partner. We construct this outcome by combining legal civil status and dates of any changes herein with the identification number of the recorded partner. We also include each formerly incarcerated person's number of *residential*

moves during the first two years following release, a gauge of residential instability. We obtain this information from the housing register, recorded by the Ministry of Housing, which contains unique identification numbers of all dwellings in Denmark, down to the apartment level, as well as the dates of any changes in who officially occupies these dwellings. From the labor market registers, we include four *labor market outcomes*. As defined in Section B.II., labor earnings cover all legal income from work during the first full year following release and employment in late November is a dummy variable indicating that the incarcerated person holds a job as of late November following release. We add two supplements to the November measure of employment. The first of these relies on the labor earnings outcome and is simply a dummy variable indicating whether the incarcerated person had any legal income from work during the first full year following release. The second of these relies on a monthly panel of reported salaries, administered by the Ministry of Employment and the Tax Authorities, and indicates whether the incarcerated person has employment at any point following release. The latter register is more detailed than the annual information we rely on for our other outcome measures of labor market outcomes, especially since it has better information on the timing of earnings relative to release. But it is not available for our full data window, only from mid-2008, which makes the annual measures our preferred ones. From the criminal justice registers (described in Section B.II.), we include three measures of *criminal recidivism*. The first one indicates reconviction within two years from release; the second one indicates re-arrest within two years, and the last one indicates that the incarcerated person was sentenced to a new prison sentence within two years from release. Last, from the National Patient Registry, we obtain indicators of *psychiatric treatment* within one and two years. The National Patient Registry is recorded by the Danish Board of Health Data and includes information on all contacts (consultancies, referrals,

treatments) in the Danish hospital sector, including the reason for the contact and the outcome. The contacts are recorded using unique identifiers that are matched to the individual identifiers and can thus be merged with our data.

B.III.C. Partner outcomes

We measure the outcomes of partners from the day the incarcerated person was admitted to prison; otherwise it would be unclear which visit we should measure from for partners who visit prison more than once, just as it would be hard to decide when to start the follow up period for partners who do not visit the incarcerated person at all. Partner outcomes cover the number of *residential moves* within two years, *labor market outcomes*, and *psychiatric treatment* within one and two years; all defined as above. Last, we use four measures of *sick leave from work*. Here, we rely on official records of weekly social benefit receipt from the DREAM register, which was already described, and we single out sick leave benefits. In Denmark, sick leave benefits can be paid out after 30 days of absence from work and contingent upon a medical report from a general practitioner, and one sick leave period cannot exceed 22 consecutive weeks. As our measures of sick leave, we use two binary indicators of having received sick leave benefits at all during one and two years, and two variables that measure the share of weeks during one and two years that the partner received sick leave benefits (that is, total number of weeks on sick leave during one and two years divided by 52 and 104 weeks, respectively).

B.III.D. Child outcomes

As for the partners, we measure child outcomes from the day the incarcerated person was admitted into prison. We merge household IDs from the population register to income data (total

income, including public benefits) from the Danish Customs and Tax Administration to indicate whether the child lives in a family with *household income lower than 50 percent of the median household income* in the population during the first full year after the admission. We use data recorded by the Ministry of Education to measure authorized and unauthorized *absence from school*, as well as total absence (authorized plus unauthorized), within three months from the incarcerated person's admission date. As a measure of *juvenile crime*, we rely on a register of criminal charges against minors from the Danish National Police (age of criminal responsibility in Denmark is 15 years) to indicate whether the child was charged with a juvenile crime within two years. Last, we use data from the Danish Ministry of Education on *standardized test scores* in Mathematics and Danish. From 2008, all children in Danish public elementary schools were required to take such tests in second, fourth, sixth, and eighth grade, and we use the test score results from the first tests that followed the incarcerated person's admission into prison. We use two different measures of test scores for both Danish and Mathematics. The first version is simply the standardized test score, and we here measure whether prison visitation matters for a child's position in the overall rank of children. The second version focuses on the risk of performing poorly on the tests, by indicating whether the child scored among the 5 percent lowest on the tests. Note that because the tests were not implemented until 2008, we only observe this outcome for a subset of the children in our data.

B.III.E. Outcome variable distributions

Table B3 shows descriptive statistics of the outcome variables, split by visitation status. In general, around 4 percent experienced solitary placement in punishment cell and more than one in four received non-solitary sanctions, such as fines or warnings, for in-prison behavior.

The amount of leave from prison is fairly high (more than one leave per month and for more than 24 hours on average), likely reflecting that a large share serves their sentence in open prisons where access to leave is less restrictive. More than half are released early on parole, which resonates with incarcerated persons in Denmark being expected to be released after having served two-thirds of their sentence (half time if good behavior, full time if bad). After release, most are single, and the rate of re-partnering is low (among those with a partner upon admission). Released incarcerated persons move frequently and have very poor labor market attachment, and, as in many other countries, a large proportion recidivates. The partners move around frequently too yet are more attached to the labor market. And although a relatively high share received sick leave benefits during one and two years, which indicates substantial health problems, a relatively low proportion received psychiatric treatment. Turning to the children, around one in four grow up in poor households and around every tenth are charged with juvenile crimes. The children also on average fall below the national average on test scores. Comparing the outcomes across visitation status shows those who do not receive any visitation fare even worse, except for on outcomes related to in-prison disciplinary actions, residential instability post release, and criminal recidivism, which may all be caused by the never visited on average being older at admission (as was shown above). For partners and children, we observe very little difference in the outcomes by visitation status.

Table B3
Descriptive Statistics of Outcome Variables, by Visitation Status.

	Visited			Never visited			Difference
	Mean	(SD)	<i>N</i>	Mean	(SD)	<i>N</i>	
Incarcerated person							
No. of solitary disciplinary sanctions per month	0.04	(0.15)	15,053	0.03	(0.17)	10,520	-0.02***
No. of non-solitary conditional disciplinary sanctions per month	0.06	(0.16)	15,053	0.04	(0.19)	10,520	-0.01***
No. of non-solitary disciplinary sanctions per month (fines)	0.27	(0.46)	15,053	0.23	(0.64)	10,520	-0.04***
No. of non-solitary disciplinary sanctions per month (warnings)	0.10	(0.24)	15,053	0.07	(0.32)	10,520	-0.03***
No. of leaves per month	2.27	(2.44)	15,053	1.26	(1.77)	10,520	-1.01***
Total hours of leave per month	45.06	(40.19)	15,053	29.24	(39.03)	10,520	-15.82***
Length of total leaves relative to sentence length	0.06	(0.06)	15,053	0.04	(0.06)	10,520	-0.02***
No. weekend leaves per month	0.68	(0.61)	15,053	0.43	(0.60)	10,520	-0.26***
Total hours weekend leave	36.29	(33.92)	15,053	23.34	(32.87)	10,520	-12.95***
Total length of weekend leaves relative to sentence length	0.05	(0.05)	15,053	0.03	(0.05)	10,520	-0.02***
Early release on parole	0.60	(0.49)	15,053	0.57	(0.50)	10,520	-0.03***
Singlehood	0.77	(0.42)	15,053	0.83	(0.38)	10,520	0.06***
Re-partnering	0.06	(0.24)	3,096	0.04	(0.20)	1,703	-0.02**
No. of residential moves	2.10	(1.22)	15,053	1.92	(1.15)	10,520	-0.18***
Labor earnings (2010 PPP USD)	9,984	(17,451)	15,053	9,556	(17,498)	10,520	-428*
Employment (labor earnings > 0)	0.43	(0.50)	15,053	0.42	(0.49)	10,520	-0.01*
Employed on last day of November	0.31	(0.46)	15,053	0.30	(0.46)	10,520	-0.01*
Employed at any point	0.35	(0.48)	10,900	0.26	(0.44)	4,705	-0.09***
Reconvicted within 2 years	0.38	(0.49)	15,053	0.37	(0.48)	10,520	-0.01*
Rearrested within 2 years	0.48	(0.50)	15,053	0.43	(0.50)	10,520	-0.05***
New prison sentence within 2 years	0.17	(0.37)	15,053	0.14	(0.35)	10,520	-0.02***
Psychiatric treatment within 1 year	0.05	(0.22)	15,053	0.05	(0.21)	10,520	-0.00*
Psychiatric treatment within 2 years	0.08	(0.27)	15,053	0.07	(0.26)	10,520	-0.01**

Partner							
No. of residential moves	1.97	(1.16)	3,096	1.74	(1.05)	1,703	-0.22***
Labor earnings (2010 PPP USD)	15,998	(19,377)	3,096	16,304	(19,795)	1,703	306
Employment (labor earnings > 0)	0.59	(0.49)	3,096	0.56	(0.50)	1,703	-0.03*
Employed on last day of November	0.49	(0.50)	3,096	0.50	(0.50)	1,703	0.01
Psychiatric treatment within 1 year	0.04	(0.20)	3,096	0.04	(0.20)	1,703	-0.00
Psychiatric treatment within 2 years	0.07	(0.25)	3,096	0.06	(0.24)	1,703	-0.01*
Sickness leave within 1 year	0.17	(0.37)	3,096	0.15	(0.36)	1,703	-0.02*
Sickness leave within 2 years	0.25	(0.43)	3,096	0.23	(0.42)	1,703	-0.02*
No. weeks on sick leave within 1 year / 52	0.04	(0.14)	3,096	0.04	(0.15)	1,703	0.00
No. weeks on sick leave within 2 years / 104	0.04	(0.12)	3,096	0.04	(0.13)	1,703	0.00*
Children							
Household income < 50% of median	0.26	(0.44)	3,180	0.22	(0.41)	2,271	-0.04**
Authorized school absence within 3 months	0.04	(0.04)	738	0.04	(0.04)	375	0.00
Unauthorized school absence within 3 months	0.01	(0.04)	738	n.a. ¹	(n.a. ¹)	375	-0.00*
Total school absence within 3 months	0.05	(0.06)	738	0.05	(0.05)	375	-0.00
Juvenile charge within 2 years	0.08	(0.27)	1,479	0.11	(0.31)	1,074	0.03*
Math test score	-0.58	(1.02)	2,604	-0.64	(1.05)	1,722	-0.06*
In bottom 5% of math test scores	0.13	(0.34)	2,604	0.14	(0.35)	1,722	0.01
Danish test score	-0.52	(1.10)	3,280	-0.54	(1.13)	2,120	-0.02
In bottom 5% of Danish test scores	0.13	(0.34)	3,280	0.13	(0.34)	2,120	-0.00

Source: Own calculations on data from Statistics Denmark and the Danish Prison and Probation Service.

¹ The Law of Statistics Denmark prevents us from publishing statistics in these cells as they are based on too few observations (fewer than 5 observations with outcome = 1).

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (two-tailed tests).

C. Additional Details on Occupancy Rates

We define the occupancy rate Z of each prison j in Denmark on day t as $Z_{j,t} = \frac{n_{j,t}}{N_{j,t}}$, which simply relates the number of incarcerated persons in a prison on a given day ($n_{j,t}$) to the capacity in that prison on that day ($N_{j,t}$). We here explain how we obtain these two numbers.

C.I.A. Daily incarcerated person counts. We rely on the incarcerations register, which the DPPS compiles from their management system and submits to Statistics Denmark each year. The incarcerations register contains admissions and releases from correctional facilities in Denmark from January 1st, 1991 and up to the latest updated version, which at the time of writing includes December 31st, 2018. Admission and release are recorded by individual (using the unique individual identifier that can be merged with other registers) and by facility (using unique facility identifiers), meaning that we can track which facility an incarcerated person is held in at each day of his or her sentence (transfers across facilities are recorded as separate spells). This data structure makes it straightforward to count the number of incarcerated persons held in each facility on each day, ($n_{j,t}$).

C.I.B. Daily prison capacity and occupancy

The DPPS only reports prison capacities on one day each year (towards year-end) and as an annual average. We thus do not directly observe the daily capacity, $N_{j,t}$. We do observe from the DPPS's annual statistics that there are substantial differences between the reported year-end capacity and the average capacity across the year within prisons, just as we observe variation in these numbers across years. As our identification strategy focuses on the daily fluctuation in the occupancy rate of the nearest relevant prison, we opt not to rely on the aggregate official

capacity numbers from the DPPS (which would produce limited variation in $N_{j,t}$) and instead estimate the daily capacity from the data. To do so, we use a percentile measure based on the number of incarcerated persons in each prison during a period prior to any given day t : $Z_{j,t}^\tau = \frac{n_{j,t}}{N_{j,t^*}^\tau}$. Here, τ denotes the τ -th percentile of the number of incarcerated persons in prison j during the period t^* (which precedes t). The idea is that the DPPS are likely to observe the number of incarcerated persons in a prison over a period just prior to assigning a new incarcerated person to a prison, and to compare the number of incarcerated persons on the assignment day to that preceding period. If there are many incarcerated persons in a prison on day t relative to the number of incarcerated persons in that prison over the preceding period (t^*), the DPPS is less likely to send the new incarcerated person to that prison. If, however, there are relatively few incarcerated persons in the prison on day t compared to what was observed in that prison over the preceding period, the incarcerated person is more likely to be assigned there. As explained in the main text body, our measure of the occupancy rate then becomes $Z_{j,t}^{95} = \frac{n_{j,t}}{N_{j,t^*}^{95}}$, where $n_{j,t}$ is the number of incarcerated persons in prison j on day t and N_{j,t^*}^{95} is the 95th percentile of the number of incarcerated persons in prison j over the preceding time period t^* . We have checked the robustness of our results by also running the analyses using different percentiles (50, 75, 90, 95, 99), something which did not change our overall conclusions to any substantial degree but did affect the strength of the instrument for the lower percentiles.

Our definition of t^* rests on the case type and when the assignment took place. In Denmark, where incarcerated persons are rarely transferred directly from the sentencing court to prison, incarcerated persons must be informed about their admission date and the assigned prison no later than 30 days before admission for incarcerated persons serving a sentence for most

crime types. For specific crime types (mainly violent crimes and weapon’s possession), however, the notice is only 10 days. Since 2000, the rules that govern the length of the period of notice have changed a few times, which we summarize in Table C1, and we define t^* accordingly.

Table C1
Required Period of Notice about Assigned Prison and Admission Date, Denmark

Date	Required notice period	
	At least 30 days	At least 10 days
May 31, 2000	All	
May 17, 2001	All other	Violent crimes; Technical violation of probation
June 17, 2005	All other	+ Rape; Technical violation of electronic monitoring
January 22, 2009	All other	+ Possession of firearms or explosives
December 5, 2016	All other	+ Illegal possession of knife
April 3, 2017	All other	+ Illegal immigration

Source: The specific legal acts (in Danish) which the dates in the table refer to may be obtained from the corresponding author.

D. Measurement Error in the Relationship Between Distance to Nearest Relevant Prison with Space and Actual Distance from Home

In the main text, Section III.B., we describe how our data contain information on some of the criteria that the DPPS uses to assign incarcerated persons to prisons in Denmark, which we use to estimate which prisons are relevant for each incarcerated person. We use information on facility type, sentence length, age, and the occupancy rate at the prisons, as mentioned. Yet two sources of error may impact our estimate of the nearest relevant prison with space. First, we do not have perfect information about which prison is the nearest relevant one (we cannot take employment prospects into account, for example). Second, during our data window, some prisons had both open and closed wings (see Table D1), and because we in our analyses define a

prison’s security level from whether it is primarily open or closed, some prisons are not counted as relevant to incarcerated persons assigned to closed prisons although in fact they were (and vice versa). We chose to focus on the primary security level of the prisons because the vast majority of cells would typically fall into this security level.

Table D1
Overview of the Prisons in our Analytical Sample

Prison	Observation Period	Security Level
Møgelkær	2004-2014	Open
Renbæk	2004-2014	Open until December 1, 2011 then both open and closed
Horsens	2004-2006	Closed, shut down on October 1, 2006
Østjylland	2006-2014	Closed, starts on October 1, 2006
Jyderup	2004-2014	Mainly open but has closed wing
Nyborg	2004-2014	Closed
Ringe	2004-2014	Closed
Vridsløselille	2004-2014	Closed
Kragsskovhede	2004-2014	Open but has closed wing from May 2005
Søbysøgård	2004-2014	Open
Horserød	2004-2014	Both open and closed
Sdr. Omme	2004-2014	Open

Notes: We exclude “Midtjylland (incl. Nr. Snede)” from the table. This prison was used both to house incarcerated persons and as a transit prison, meaning that many incarcerated persons would be placed there only to be transferred to their intended prison. As we cannot distinguish these incarcerated persons clearly in the data, we opted to exclude the prison altogether.

Because of these measurement errors in prison relevance, a minority of incarcerated persons (16.4 percent) end up with negative estimates of distance between the nearest relevant prison that has space and the prison to which they are eventually assigned. Some of the negative distance are extreme (exceeding –250 kilometers), which impacts the strength of our instrument significantly. To minimize the impact of this measurement issue, we deleted observations with negative distances (numerically) exceeding the median of all negative distances in the data (median is –56.2 kilometers), which corresponds to 8.2 percent of the data (see Table B1). Figure

D1 shows the importance of deleting these extreme observations by plotting average distance from incarcerated persons' home to the prison they were eventually assigned by the occupancy rate at the estimated nearest relevant prison.

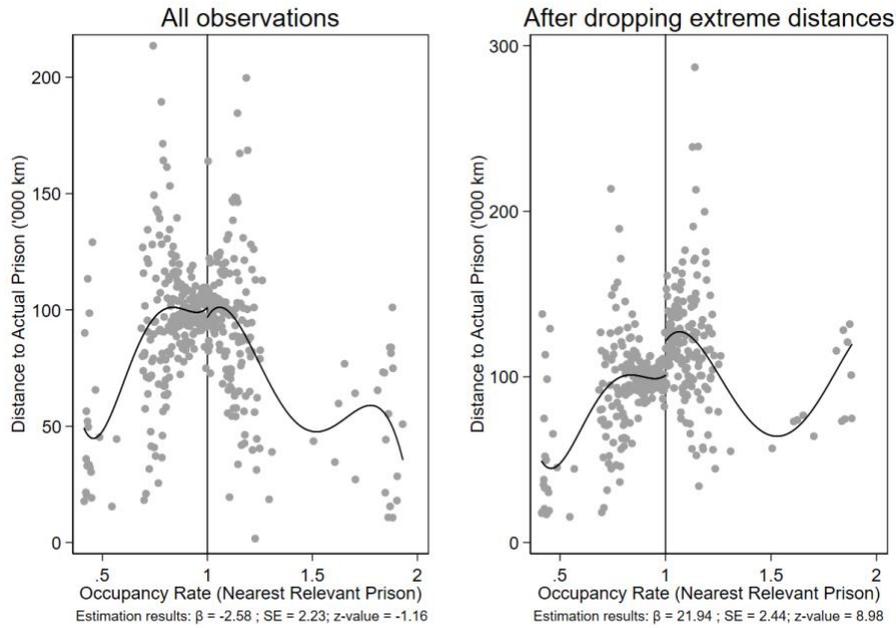


Figure D1

Distribution of Distance to Assigned Prison Including and Excluding Extreme Observations.

Notes: Beta estimates, standard errors and z-values noted below the x-axes refer to the potential level shift in distance from home around occupancy rate 1 at the nearest relevant prison. Lines are fitted using local polynomial smoothing.