

How Children's Educational Outcomes and Criminality Vary by Duration and Frequency of Paternal Incarceration

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Existing studies of the consequences of paternal incarceration for children treat paternal incarceration as a dichotomous event (a child either experiences paternal incarceration or does not), although effects could accumulate with both the frequency and duration of paternal incarcerations. In this article I use register data on Danish children from birth cohort 1991, some of whom experienced paternal incarceration before age 15, to show how educational outcomes and criminality up to age 20 vary by frequency and total duration of paternal incarceration. The high quality of Danish register data also allows me to distinguish between paternal arrest and paternal incarceration and to show results for the total duration of paternal incarcerations conditioned on frequency of paternal incarceration. Results show that educational outcomes and criminality indeed correlate with duration and frequency of paternal incarceration, indicating that treating paternal incarceration as a dichotomous event blurs important heterogeneity in the consequences of paternal incarceration.

Keywords: paternal incarceration; educational outcomes; criminality; register data

Paternal incarceration is not only highly prevalent in the United States, especially among black families and among families with poor educational backgrounds, it is also highly consequential for children's life course outcomes (e.g., S. H. Andersen and Wildeman 2014; Foster and Hagan 2007; Wildeman 2009;

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Wildeman and Western 2010). Research has shown that families experience reduced social capital, more financial problems, and more emotional issues when a family member is incarcerated (Hagan and Dinovitzer 1999), all likely to translate into negative outcomes for children. Children who experience paternal incarceration have worse health, lower well-being, and more delinquency than children who do not experience paternal incarceration (Geller et al. 2012; Haskins 2014; Porter and King 2015; Turney 2014; Wakefield and Wildeman 2011, 2013; Wildeman 2010, 2012). And, importantly, even though mass imprisonment has made paternal incarceration a much more common experience among children in the United States relative to children in other developed democracies (Wildeman and L. H. Andersen 2015), the negative effects of paternal incarceration have also been identified in other developed democracies, such as the United Kingdom (e.g., Murray and Farrington 2005), Norway (e.g., Murray, Janson, and Farrington 2007), the Netherlands (e.g., Besemer et al. 2011), and Denmark (e.g. Wildeman et al. 2014).

Existing studies generally treat paternal incarceration as a dichotomous event, an experience a child either goes through or does not (e.g., S. H. Andersen and Wildeman 2014; Geller 2013; Geller and Franklin 2014; Porter and King 2015; Turney and Wildeman 2013; Wildeman 2009). But paternal incarceration is not a dichotomous event, nor is it a uniform treatment where all children who experience paternal incarceration are influenced in the same way. Paternal incarceration spans anything from a father being arrested and spending a night in jail (which the child might not even realize) to fathers who experience frequent incarcerations or who receive sentences so long that they are separated from their children through much of childhood and adolescence. Treating paternal incarceration as dichotomous also makes it virtually impossible to disentangle whether, for example, frequent or very short paternal jail stays are as harmful to children as are longer stretches of paternal incarceration. Thus, we do not know whether effects on children arise from (1) the durable separation caused by imprisonment, (2) family instability from cycling in and out of the criminal justice system, or (3) generalized effects arising from all forms of contact with the criminal justice system (stigma effects). All three theoretical expectations seem warranted. Research has shown that higher divorce rates among incarcerated men (Apel et al. 2010; Lopoo and Western 2005) are driven by separation caused by imprisonment and not by incarceration in itself (Massoglia, Remster, and King 2011). Divorce is widely accepted to affect children in various ways (Amato 2000), and family instability has damaging effects on children as well (e.g., Lee and McLanahan 2015). Contact with the criminal justice system fosters stigmatization and makes potential employers reluctant to hire people with a criminal record (Pager 2003), but such stigmatizing effects are apparent even for people who are not formally processed by the criminal justice system past the point of arrest but who happen to have their mugshots accessible online (Lageson, this volume). If stigma-induced decreases in employment and income drive the effects of paternal criminal justice contact and incarceration, the impact of even very short jail stays could be devastating for families.

Existing research analyzes paternal incarceration as a dichotomous event largely as a result of data limitations. Analyzing how children's educational outcomes and criminality vary by duration and frequency of paternal incarceration raises specific data requirements that are not met by most datasets. First, it requires a dataset with educational outcomes and criminality measures for children who experience paternal incarceration and comparable children who do not. Second, it requires precise information on the frequency and duration of all the paternal incarcerations that these children experience. Third, it requires a large enough sample to run reliable statistical models by frequency and duration of paternal incarceration (and preferably frequency and duration simultaneously, as the impact on children is likely to differ by whether the father is permanently absent due to a long sentence or cycles back and forth between home and jail).

Paternal incarceration thus includes great heterogeneity in both frequency and duration, but data limitations prevent us from knowing whether this heterogeneity matters for children's outcomes. This gap in research is problematic for two reasons. First, not knowing how children's outcomes vary by types of paternal incarceration limits our understanding of the mechanisms that drive paternal incarceration effects. Such variation is likely to be important. Research on family instability more generally, for example, suggests that family instability is harmful to children. Wu and Martinson (1993) initiated this line of research by showing an increased risk of premarital birth among children who grew up in unstable families relative to children who grew up with prolonged mother-only care. Additional research has distinguished instability effects from selection effects and found that both types of effects are substantial (Fomby and Cherlin 2007), and has shown that type of family transition is important for children's cognitive and socioemotional development (Lee and McLanahan 2015). Lack of knowledge about whether paternal incarceration works in similar ways is problematic because it severely limits the possibilities for targeting this important issue—a first step in gaining such knowledge is to analyze whether children differ by frequency and duration of paternal incarceration. Second, the gap in research is problematic because we run the risk of misinterpreting the consequences of paternal incarceration as identical among children of low-level and high-level offenders—a risk that seems all the more important to avoid in a time where scholars and decision-makers are debating how best to reform the criminal justice system to counteract the negative consequences of imprisonment (Wildeman and Western 2010). Paternal incarceration is not a dichotomous event, and researchers should inform decision-makers that the general effects of paternal incarceration are indeed weighted averages of heterogeneous effects by frequency and duration of paternal incarceration.

Here, I use Danish register data to analyze how children's educational outcomes and criminality vary by frequency and total duration of paternal incarceration. Danish register data allow me to meet the data requirements that limit U.S.-based research in this field. I use data from the entire 1991 birth cohort and report their outcomes at age 20 (in 2011). First, these data provide educational outcomes (the share of elementary school exams failed and high school dropout rates) and various criminality measures (criminal convictions, incarcerations,

prison sentences, and convictions of violent crimes) for the same group of children. Second, these data provide precise information on the frequency and duration of every paternal incarceration a child experiences. Third, these data provide a full population sample, which is sufficiently large to run reliable statistical models by frequency and duration (and frequency and duration simultaneously) of paternal incarcerations—and they even allow me to show results for children who experience only paternal arrest. Finally, these data provide a comparison sample of children from the same birth cohort who did not experience paternal incarceration.

My empirical approach to analyzing how children's educational outcomes and criminality vary by duration and frequency of paternal incarceration follows two steps. In the first step, I show how children's educational outcomes and criminality differ by duration and frequency of paternal incarceration. In the second step, I show that even when I control for a wide range of observable characteristics (mainly parental background variables) within a regression framework, these outcomes still differ by duration and frequency of paternal incarceration. These results do not allow me to control unobserved differences between children who experience paternal incarceration and children who do not, and thus do not allow me to distinguish selection issues from the effects of frequency and duration of paternal incarceration. Yet results direct our attention to an important gap in our understanding of the consequences of paternal incarceration: frequency and duration of paternal incarceration could matter for children's educational outcomes and criminality.

Context, Data, and Analytic Steps

Paternal incarceration differs greatly between the United States and Denmark, not just in scope and duration, but also in terms of conditions of confinement (Pratt 2008; Ugelvik and Dullum 2012). The United States has more than 700 people incarcerated per 100,000 citizens. Denmark has 73 (Walmsley 2013). Only eight prisoners died in Denmark during 2013. Taking into account that the Danish incarceration rate is only one tenth of that in the United States, this number is still dwarfed by the almost 4,500 local jail prisoners (967) and state prisoners (3,479) who died while incarcerated in the United States during 2013 (Danish Prison and Probation Service 2014; Noonan, Rohloff, and Ginder 2015). Sentences are much shorter in Denmark: seven months on average, and only 39 percent of sentences in Denmark exceed three months (Danish Prison and Probation Service 2014). For comparison, the mean sentence length in the United States in 2008–2009 was around 4.7 years for federal prisoners and 2.1 years for state prisoners (Guerino, Harrison, and Sabol 2011; Motivans 2012).

As a result, paternal incarceration is a much less common experience among Danish children than among children living in the United States, and it happens for shorter periods (Wildeman and L. H. Andersen 2015). Also, the impact of incarceration on fathers is likely to be greater in the United States because prison

conditions are so much harsher. But results from Denmark are still informative in comparative perspective, as they can be conceived of as comparable to short incarceration spells in the United States—most of which are spent in jail and on which very little research exists.

In sum, results from Denmark provide new comparative insights into the consequences of short incarceration spells in the United States. And despite differences in penal policies, incarceration rates, conditions of confinement, and the risk of experiencing paternal incarceration, research has identified similar consequences of paternal incarceration in Denmark as in the United States. Data from Denmark also allow researchers to answer important questions that are impossible to answer with available U.S. sources. Using Danish register data, Wildeman, S. H. Andersen, Lee, and Karlson (2014), for example, showed that paternal (and maternal) incarceration increases male child mortality up to age 20. And, using Danish register data coupled with a policy reform that extended the use of community supervision as a noncustodial alternative to imprisonment in 2000, S. H. Andersen and Wildeman (2014) found substantial causal effects of paternal incarceration on children's risk of being placed in foster care.

Data

Statistics Denmark collects individual-level information on all Danish citizens from a range of governmental agencies, such as the Ministry of Education and the Prison and Probation Service. Researchers are allowed to merge the individual-level information across various registers, using unique personal identifiers, and Danish register data are thus an individual-level full population panel of all contacts with governmental agencies since 1980. Danish register data from Statistics Denmark are accurate and high quality (they suffer from little attrition), and although Denmark is a small country with only 5.5 million citizens, full population data alleviate most worries over sample size.

To show how children's educational outcomes and criminality vary by duration and frequency of paternal incarceration, I use the 1991 birth cohort and follow these children in the registers through age 20 in 2011.

Paternal incarceration. From the population register I identify children's biological fathers and add information on these fathers' incarcerations from the criminal justice registers. Thus, I define paternal incarceration as the incarceration of the biological father, resident or not.

Precise dates of admission and release for any incarceration in Denmark are available from 1990, which allows me to move beyond paternal incarceration as a dichotomous event and to analyze both the frequency and total duration of paternal incarceration (and to show results for children who experienced only paternal arrest). I count as paternal incarceration any incarceration spell that occurred following the child's birth and started before the child's fifteenth birthday. For comparison, I also keep all of the children who did not experience paternal incarceration.

Educational outcomes and criminality. I use two measures of educational outcomes and four criminality measures. The first educational outcome measures the share of elementary school exams that the child did not pass. Elementary school exams typically occur at age 15 or 16, when the child leaves elementary school to pursue high school (or equivalent vocational training). Failure to pass these exams is problematic, because it signals a lack of basic educational skills and impairs these children's chances of enrolling in high school.

The second educational outcome is high school dropout. I obtain the date and reason (dropout or graduation) for leaving an educational institution, which allows me to measure whether each child experienced dropping out of high school (or equivalent vocational training) up to age 20. It is important to note that my measure of high school dropout entails only dropping out; it does not measure whether the dropout is followed by enrollment in another educational institution (which is likely to be the case for many children, since the dropout rates for all children in my sample seem high). This caveat affects the overall level of high school dropout in my sample, yet it does not impair the comparative component of results across frequency and duration of paternal incarceration.

I measure criminality using four variables: criminal conviction, violent crime, incarceration, and prison sentence. The minimum age of criminal responsibility in Denmark is 15 years (offenses at younger ages are thus not registered), and I measure and cumulate these criminality outcomes from a child's fifteenth birthday and up to his or her twentieth birthday. Criminal conviction thus measures whether the child was convicted of a crime up to age 20 (traffic offenses and possession of drugs [not for resale] are not criminal offenses in Denmark, and they are thus not counted using this variable); violent crime measures whether the child was convicted of a violent crime up to age 20; incarceration measures whether the child was incarcerated (including arrests) up to age 20; and prison sentence measures whether the child received a prison sentence (of any length) up to age 20.

Control variables. As control variables I add information on the child, the family type, the mother, and the biological father. From the child, I include only sex and an indicator of whether the child has ethnic minority background, because all child variables except sex and ethnic minority background are endogenous to family type and parental variables. I measure family type as whether the mother and father were married, divorced, or cohabiting at the time the child was born in 1991. As parental control variables I add a range of information separately for the mother and the biological father, all measured just before the child was born. I add their age when the child was born, years of education, gross income including social benefit transfers, and earnings. Measured as share of the year before the child was born, I include unemployment rates, rates of receiving disability pension, and rates of receiving sick leave benefits. I also include a dummy variable indicating whether the mother or biological father were convicted of crimes prior to the child's birth, and a dummy variable indicating whether the parent had any missing information in the registers. Finally, a

substantial share of fathers had missing information in the education register but not in other registers. These fathers are marked using a binary indicator.

Analytic steps

My empirical approach to analyzing how children's educational outcomes and criminality vary by duration and frequency of paternal incarceration follows two steps. The first step uses simple descriptive and bivariate analyses to show that one should be wary of treating paternal incarceration as a dichotomous event. Many children experience more than one paternal incarceration, and children differ in the total duration of paternal incarceration that they experience. I then show that educational outcomes and criminality indeed correlate with frequency and total duration of paternal incarceration.

The second step shows that there are substantial differences between children who experience paternal incarceration and children who do not. This result is not surprising, given research on paternal incarceration and social inequality (e.g., Wakefield and Wildeman 2013), and simply alludes to the fact that paternal incarceration is not a random variable. There are also large differences between children by frequency and total duration of paternal incarceration. The implication is that direct comparisons of educational outcomes and criminality by frequency and duration of paternal incarceration, which were presented in the first analytic step, could be subject to severe selection issues. I then show that even when I use multivariate analyses to control for the wide range of child, family type, and parental background variables that I described in the data section, educational outcomes and criminality still differ by duration and frequency of paternal incarceration. To secure comparability of coefficients across models, I use simple OLS estimation (for a discussion of the incomparability of coefficients in nonlinear models, see Karlson, Holm, and Breen 2012).

Results from the second analytic step do not allow me to control unobserved differences between children who experience different frequencies and total durations of paternal incarceration (and children who do not). Thus, I cannot fully distinguish selection issues from the effects of frequency and duration of paternal incarceration. One solution often used to tackle selection issues is propensity score matching (e.g., Mears and Siennick 2016). With this method, only children who, on average, are similar on observed characteristics are compared. The researcher then takes the leap of faith that because of the similarity in observed characteristics among the matched children, these children are also, on average, similar regarding unobserved characteristics—and any differences between their outcomes are said to express the causal effect of paternal incarceration. I refrain from applying propensity score methods because answering my research question would require the estimation of one propensity score model per comparison across frequency and duration of paternal incarceration. Not only would this imply the estimation of as much as thirty-five models, it would also make the results by frequency and duration of paternal incarceration incomparable, as the matched children would not be the same across all these

propensity score models (and this would essentially imply comparing results from different subsamples). Thus, my results will indeed suffer from selection issues, but the totality of results still directs attention to an important gap in our understanding of the consequences of paternal incarceration: children's educational outcomes and criminality vary by frequency and total duration of paternal incarceration, and researchers should not view paternal incarceration as a dichotomous event.

Results

Step one: Paternal incarceration is not a dichotomous event

Table 1 shows the number of observations by frequency and total duration of paternal incarceration for the children in my sample. Almost 90 percent (56,017) of children from the 1991 Danish birth cohort did not experience any paternal incarceration by their fifteenth birthday.

Alluding to the relevance of not analyzing paternal incarceration as a dichotomous event, almost half of the children who experienced paternal incarceration experienced more than one paternal incarceration (Mears and Siennick [2016] find a similar share with more than one parental incarceration in the Add Health data). Only 13 percent experienced five or more paternal incarcerations, and only 7 percent experienced a total duration of paternal incarceration that exceeded one year. But almost 60 percent of the children who experienced paternal incarceration experienced only paternal arrest, corresponding to their father being held in custody for less than 24 hours; a result that stresses the relevance of duration of paternal incarceration.

Table 1 also shows the joint distribution of frequency and total duration of paternal incarceration, and these numbers show that paternal incarceration is indeed a heterogeneous treatment. Four out of five of the children who experienced paternal incarceration did so infrequently (one or two times) and for a comparatively short total duration (fewer than three months). Yet more than a thousand children also experienced frequent (more than two times) and durable (three months or longer) paternal incarceration. Fewer children experienced infrequent but durable paternal incarcerations (which are likely to be the result of a long prison sentence; $n = 210$) and frequent paternal incarcerations with a low total duration (which are likely to be caused by several arrests; $n = 687$).

Figure 1 shows how the educational outcomes are distributed by frequency, duration, and frequency and duration of paternal incarceration. All of the subfigures exhibit a staircase correlation between educational outcomes and frequency and duration of paternal incarceration: As frequency and duration of paternal incarceration increase, so too does the share of exams failed and the high school dropout rate. Also, there are substantial differences in educational outcomes between children who experience paternal incarceration and children who do not. Children who experience only one paternal incarceration, children who experience only paternal arrests, and children who experience only infrequent

TABLE 1
 Number of Children, by Frequency and Total Duration of Paternal Incarceration

Variable	N
<i>Frequency</i>	
No paternal incarceration	56,017
1 paternal incarceration	3,274
2 paternal incarcerations	1,248
3 paternal incarcerations	566
4 paternal incarcerations	344
5+ paternal incarcerations	814
<i>Total duration</i>	
No paternal incarceration	56,017
Arrest only	3,616
< 3 months	1,732
3–12 months	430
12+ months	468
<i>Frequency and total duration</i>	
No paternal incarceration	56,017
Low freq. / Low total duration	4,327
Low freq. / High total duration	195
High freq. / Low total duration	1,063
High freq. / High total duration	661

and short paternal incarcerations, for example, all fail around twice as many exams as the children who do not experience any paternal incarcerations. The increase in these outcomes as frequency and duration of paternal incarceration increases is less steep, suggesting that there could be a strong selection effect in which children experience paternal incarceration in the first place, but also suggesting that there could be cumulative disadvantages from experiencing paternal incarceration more often and for longer periods.

Figure 2 shows how the criminality outcomes are distributed by frequency, duration, and frequency and duration of paternal incarceration. Again, all of the subfigures exhibit a staircase correlation between these outcomes and frequency and duration of paternal incarceration. As frequency and duration of paternal incarceration increase, so too do all of the criminality outcomes. For example, only 5 percent of children who did not experience any paternal incarceration face criminal conviction by age 20. The same number for children who experience frequent and durable paternal incarcerations is close to 30 percent. And, again, there are substantial differences in outcomes between children who experience paternal incarceration and children who do not, across all of the criminality outcomes.

In sum, my first analytic step has shown that paternal incarceration is not a dichotomous event and that paternal incarceration is not likely to affect all

FIGURE 1
Share of Exams Failed and High School Dropout, by Frequency, Total Duration, and
Frequency and Total Duration of Paternal Incarceration

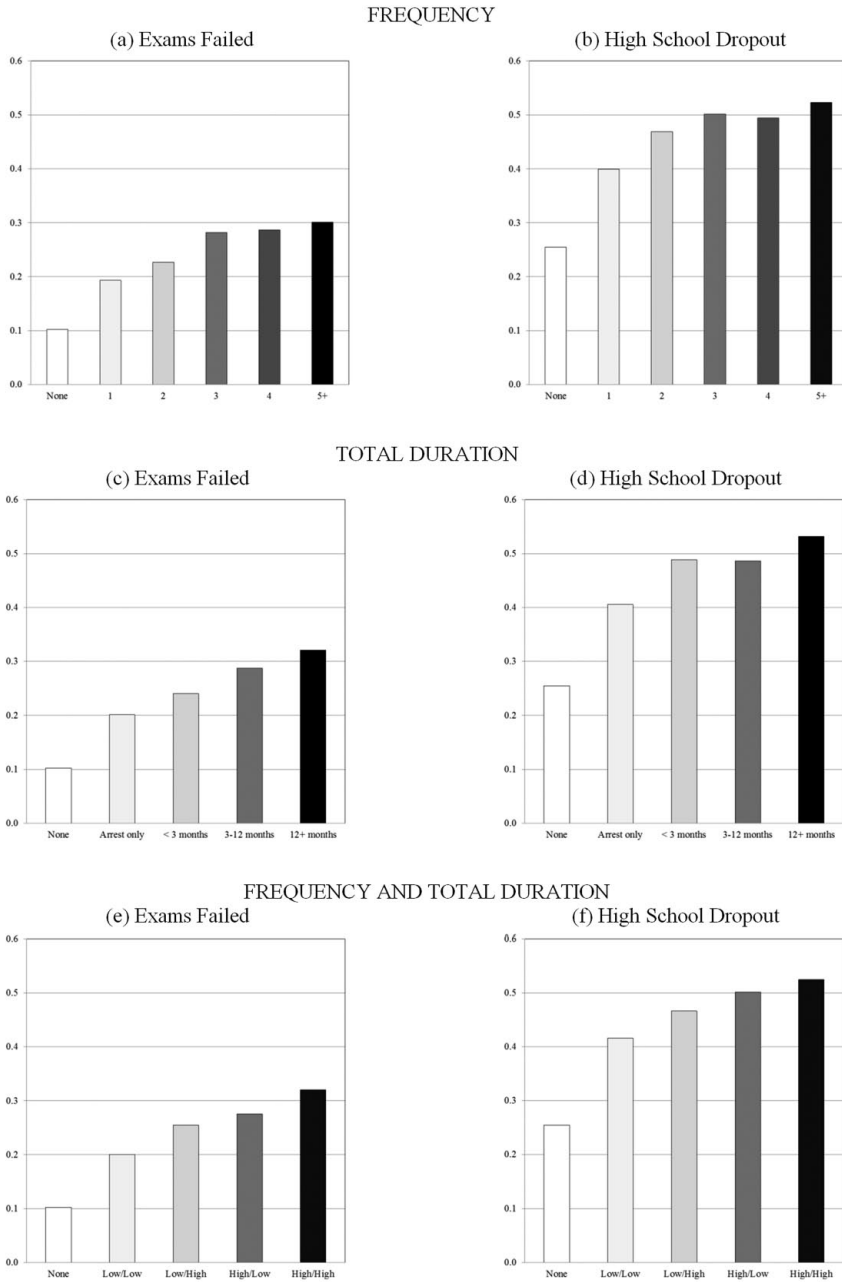
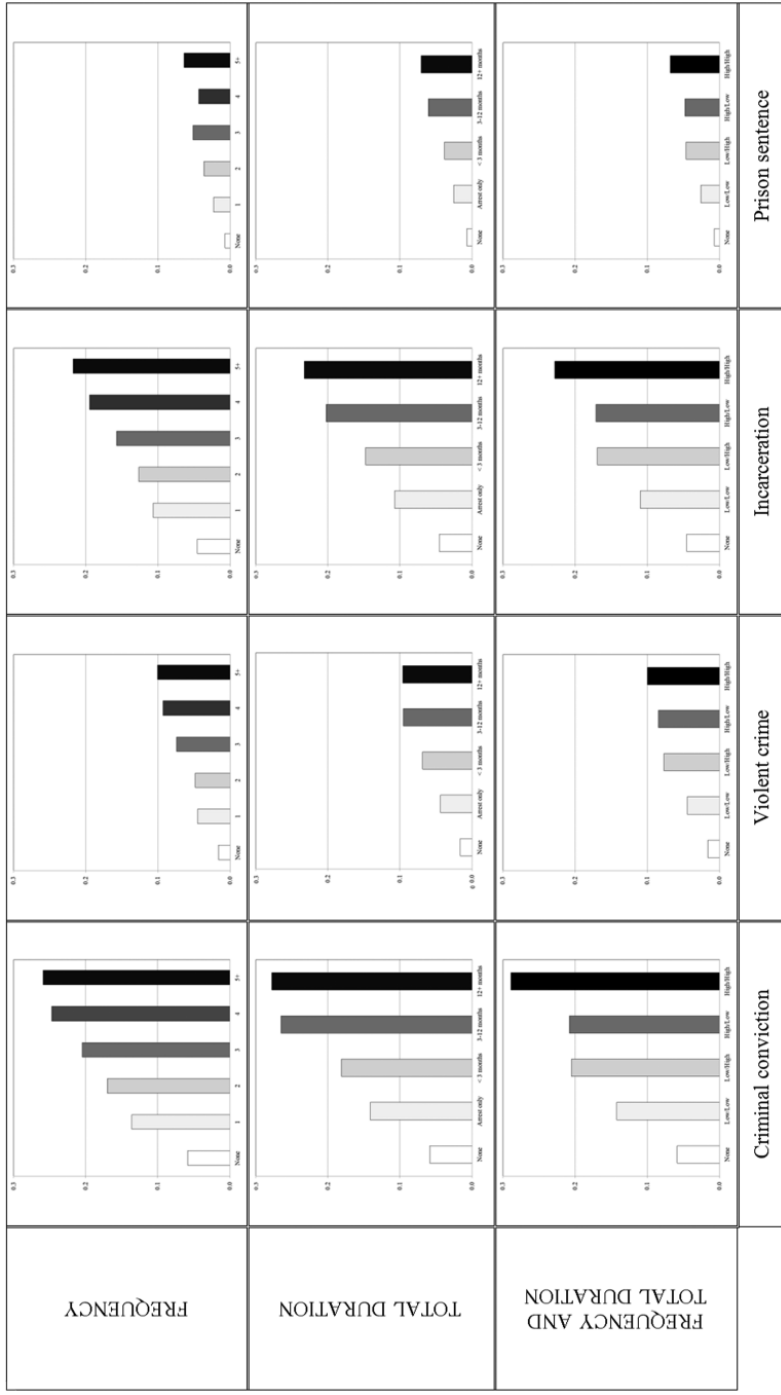


FIGURE 2
Share with Criminal Conviction, Violent Crime, Incarceration, and Prison Sentence at Age 20, by Frequency, Total Duration, and Frequency and Total Duration of Paternal Incarceration



children in the same way. Experiencing paternal incarceration is a question of frequency and duration, and many children experience more than one paternal incarceration, just as many children experience only paternal arrest (and others experience more durable paternal incarceration). Frequency and duration of paternal incarceration are strongly correlated with educational outcomes and criminality, and children who experience more frequent or more durable paternal incarcerations fare worse on these outcomes.

Step two: When controlling for background, frequency and duration still matter

Table 2 shows means and standard deviations of background characteristics among children who either experience paternal incarceration or do not. The statistically significant and substantially important differences between these children on all background characteristics implies that paternal incarceration is not a random variable. A higher share of children who experience paternal incarceration are ethnic minorities. More are from unstable family types, as indicated by lower shares of these children being born into marriage or cohabitation.

Turning to background characteristics of the parents, the same image materializes: Children who experience paternal incarceration have mothers and fathers who, on average, were younger when they had the child, are less educated, lower income, and more dependent on income transfers. Both mothers and fathers are also much more likely to have been convicted of crimes prior to the child's birth than parents of children who do not experience paternal incarceration.

The differences in background characteristics between children who experience paternal incarceration and children who do not implies that direct comparisons of educational outcomes and criminality by frequency and duration of paternal incarceration, which were presented in the first analytic step, could be subject to severe selection issues. If specific types of disadvantaged children experience paternal incarceration, and their disadvantage is associated with educational outcomes and criminality, the differences in outcomes could be driven partly or entirely by these children growing up under more disadvantaged conditions. And the same applies to comparing the consequences of paternal incarceration across frequency and duration of paternal incarceration. Tables A1–A3 in the appendix show descriptive statistics by frequency and duration of paternal incarceration. These tables show that, in general, children who experience more frequent or more durable paternal incarceration come from more disadvantaged backgrounds. For example, during the year before the child was born, both mothers and fathers of children who experience more than five paternal incarcerations earned around half of what mothers and fathers of children who experience one paternal incarceration did. The same is true regarding durable paternal incarcerations as well as frequent and durable paternal incarcerations.

Table 3 presents results from regression analyses in which the background characteristics mentioned above were controlled. I show only the parameter estimates associated with frequency and duration of paternal incarceration (reference category is no paternal incarceration).

TABLE 2
Descriptive Statistics of Background Characteristics, by Paternal Incarceration

Variable	No paternal incarceration		Paternal incarceration		T-test p-value
	M	(SD)	M	(SD)	
<i>Child covariates</i>					
Female	.486	(.500)	.501	(.500)	*
Ethnic minority background	.052	(.222)	.118	(.322)	***
<i>Family type</i>					
Parents married	.519	(.500)	.372	(.483)	***
Parents divorced	.037	(.188)	.060	(.237)	***
Parents cohabiting	.871	(.336)	.706	(.456)	***
<i>Mother's background</i>					
Age	28.805	(4.586)	26.555	(5.000)	***
Years of education	11.649	(3.227)	9.879	(3.498)	***
Gross income	142.085	(76.679)	101.002	(72.034)	***
Earnings	115.567	(77.659)	73.939	(71.954)	***
Unemployment rate	136.865	(252.589)	215.324	(296.096)	***
Disability pension rate	.003	(.052)	.008	(.085)	***
Sick leave benefit rate	.009	(.056)	.015	(.073)	***
Previously convicted	.032	(.177)	.125	(.331)	***
<i>Father's background</i>					
Age	29.265	(9.952)	25.685	(11.485)	***
Years of education	11.129	(4.602)	8.624	(5.060)	***
Gross income	199.585	(149.054)	126.012	(134.088)	***
Earnings	163.670	(118.882)	97.457	(100.143)	***
Unemployment rate	.064	(.177)	.172	(.279)	***
Disability pension rate	.004	(.058)	.010	(.098)	***
Sick leave benefit rate	.009	(.054)	.020	(.085)	***
Previously convicted	.094	(.292)	.366	(.482)	***
Missing in registry	.075	(.264)	.133	(.340)	***
Missing in education registry only	.039	(.193)	.086	(.280)	***
N	56,017		6,246		

*p < .05. ***p < .001.

Almost all parameter estimates in Table 3 are statistically significant. This significance implies that children who experience different frequencies and total durations of paternal incarceration differ in their educational outcomes and criminality from children who do not experience paternal incarceration. Again, differences increase by frequency and duration across all outcomes, a finding that indicates that frequency and duration of paternal incarceration are key aspects of paternal incarceration and should be taken into account, even when controlling for a wide range of background characteristics.

TABLE 3
 Differences in Outcomes between Children Who Experience Paternal Incarceration and Children Who Do Not, by Frequency and Duration of Paternal Incarceration, Controlling for Background Characteristics

	Exams failed	High school dropout	Criminal conviction	Violent crime	Incarceration	Prison sentence
<i>Frequency</i>						
1 paternal inc. ^a	.046 ^{***} (.006) ^{cde}	.079 ^{***} (.009) ^{bc}	.047 ^{***} (.006) ^{cde}	.018 ^{***} (.004) ^{de}	.039 ^{***} (.005) ^{cde}	.010 ^{***} (.003) ^{ce}
2 paternal inc. ^b	.062 ^{***} (.010) ^{ce}	.120 ^{***} (.014) ^a	.066 ^{***} (.011) ^{de}	.015 [*] (.006) ^{de}	.048 ^{***} (.009) ^{de}	.021 ^{***} (.005) ^e
3 paternal inc. ^c	.103 ^{***} (.016) ^{ab}	.131 ^{***} (.021) ^a	.091 ^{***} (.017) ^a	.037 ^{***} (.011)	.073 ^{***} (.015) ^{ae}	.034 ^{***} (.009) ^a
4 paternal inc. ^d	.100 ^{***} (.020) ^a	.105 ^{***} (.027)	.123 ^{***} (.023) ^{ab}	.052 ^{***} (.016) ^{ab}	.101 ^{***} (.021) ^{ab}	.025 [*] (.011)
5+ paternal inc. ^e	.100 ^{***} (.014) ^{ab}	.114 ^{***} (.018)	.126 ^{***} (.015) ^{ab}	.056 ^{***} (.010) ^{ab}	.118 ^{***} (.014) ^{abc}	.043 ^{***} (.009) ^{ab}
Control variables	YES	YES	YES	YES	YES	YES
N	58,117	62,263	62,263	62,263	62,263	62,263
R ²	.091	.061	.059	.030	.061	.023
<i>Total duration</i>						
Arrest only ^a	.053 ^{***} (.005) ^d	.084 ^{***} (.008) ^b	.052 ^{***} (.006) ^{cd}	.016 ^{***} (.003) ^{bcd}	.040 ^{***} (.005) ^{bcd}	.012 ^{***} (.003) ^{cd}
< 3 months ^b	.068 ^{***} (.008) ^d	.125 ^{***} (.012) ^a	.071 ^{***} (.009) ^{cd}	.033 ^{***} (.006) ^a	.065 ^{***} (.008) ^{ad}	.022 ^{***} (.005) ^d
3–12 months ^c	.090 ^{***} (.019)	.086 ^{***} (.024)	.134 ^{***} (.021) ^{ab}	.051 ^{***} (.014) ^a	.104 ^{***} (.019) ^a	.040 ^{***} (.011) ^a
12+ months ^d	.108 ^{***} (.018) ^{ab}	.112 ^{***} (.024)	.138 ^{***} (.020) ^{ab}	.048 ^{***} (.013) ^a	.128 ^{***} (.019) ^{ab}	.049 ^{***} (.012) ^{ab}
Control variables	YES	YES	YES	YES	YES	YES
N	58,117	62,263	62,263	62,263	62,263	62,263
R ²	.090	.061	.059	.029	.061	.023
<i>Frequency and total duration</i>						
Low freq. / Low dur. ^a	.050 ^{***} (.005) ^{cd}	.091 ^{***} (.008) ^c	.051 ^{***} (.005) ^{cd}	.016 ^{***} (.003) ^{cd}	.040 ^{***} (.005) ^{cd}	.013 ^{***} (.002) ^{cd}
Low freq. / High dur. ^b	.062 [*] (.026)	.081 [*] (.035)	.083 ^{**} (.028) ^d	.036 (.019)	.078 ^{**} (.026)	.027 (.015)
High freq. / Low dur. ^c	.095 ^{***} (.012) ^a	.124 ^{***} (.016) ^a	.092 ^{***} (.012) ^{ad}	.047 ^{***} (.008) ^a	.085 ^{***} (.011) ^{ad}	.031 ^{***} (.006) ^a
High freq. / High dur. ^d	.110 ^{***} (.015) ^a	.106 ^{***} (.020)	.150 ^{***} (.017) ^{abc}	.053 ^{***} (.011) ^a	.125 ^{***} (.016) ^{ac}	.047 ^{***} (.010) ^a
Control variables	YES	YES	YES	YES	YES	YES
N	58,117	62,263	62,263	62,263	62,263	62,263
R ²	.091	.061	.059	.030	.061	.023

NOTE: Results from OLS models. Reference category is no paternal incarceration in all models. Superscripts indicate parameter estimates that differ from each other, within each model. * $p < .05$. ** $p < .01$. *** $p < .001$.

Lending further support to the hypothesis that the consequences of paternal incarceration differ by frequency and total duration of paternal incarceration, the differences within each model between many of the parameter estimates associated with frequency and duration of paternal incarceration are statistically significant. I changed the reference category of frequency and duration of paternal incarceration within each model to reach this conclusion (parameter estimates that differ at the 5-percent level are marked using superscripts following their standard error estimates). For example, children who experience only paternal arrest have a higher risk of experiencing incarceration before age 20 than children who do not experience paternal incarceration (this is significant at the .001 level). But they also differ from children who experience paternal incarceration for less than three months, 3–12 months, and more than a year, signified by ^b, ^c, and ^d.

In sum, my second analytic step shows that even though there are important differences between background characteristics of children who experience paternal incarceration and children who do not (and between children who experience different frequencies and durations of paternal incarceration), children's educational outcomes and criminality still vary by frequency and total duration of paternal incarceration once these differences are taken into account in a regression framework. Children who experience more frequent or more durable paternal incarcerations fare worse on these outcomes even when controlling for a wide range of background characteristics.

Discussion

When we treat paternal incarceration as a dichotomous event—something a child either does or does not experience—heterogeneity in its effects on children is blurred. Analyzing how educational outcomes and criminality vary by frequency and total duration of paternal incarceration, I have shown that (a) children do indeed differ in their paternal incarceration experience, and (b) educational outcomes and criminality up to age 20 are strongly correlated with frequency and duration of paternal incarceration, even after adjusting for a host of preexisting differences between these children.

The recent upsurge in research on the consequences of paternal incarceration for children has shown that paternal incarceration is not only a common experience for many children, especially among black and disadvantaged families, it is also highly consequential for various child outcomes, such as health and well-being. But because of data limitations these studies generally treat paternal incarceration as a dichotomous event, often obtained from children's self-reports, the father's self-report, or the mother's reporting in surveys (e.g., Geller 2013; Geller and Franklin 2014; Porter and King 2015; Turney and Wildeman 2013). These data limitations impair these studies' ability to take into account frequency and total duration of paternal incarceration.

In the current study, I used Danish register data to analyze how educational outcomes and criminality vary by duration and frequency of paternal incarceration. I compiled a sample of all children born in Denmark in 1991 who

experienced paternal incarceration before their fifteenth birthday, and I added children from the same birth cohort who did not have this experience. Administrative records provided exact dates of admission and release for all paternal incarcerations experienced by these children, which allowed me to measure both frequency and total duration of paternal incarceration and allowed me to measure paternal arrests. Educational outcomes and criminality were measured and cumulated up to the child's twentieth birthday. Child and family background variables were measured just before the child was born in 1991 to avoid control variables being influenced by paternal incarceration.

My main finding is that the heterogeneity of paternal incarceration affects children differently by frequency and total duration of paternal incarceration. Dramatic differences in scope and duration of paternal incarceration, and in conditions of confinement, between the United States and Denmark could raise concerns over the generalizability of these results from Denmark. But, importantly, negative effects of paternal incarceration have been identified in other developed democracies, such as the United Kingdom, the Netherlands, and Norway, which also differ in their incarceration rates (148, 82, and 72 per 100,000 citizens in the United Kingdom, the Netherlands, and Norway, respectively; Walmsley 2013). Thus, in comparative perspective, results from Denmark show that frequency and duration of paternal incarceration matter in one of the countries with the lowest incarceration rates among developed democracies (and among developed democracies where negative effects of paternal incarceration have been identified), and it seems all the more likely that duration and frequency of paternal incarceration could matter in other developed democracies, too. Specifically, results from Denmark, where sentences are comparatively short, could be comparable to short incarceration spells in the United States, most of which are spent in jail and of which we know relatively little.

General implications

Knowing that educational outcomes and criminality for children vary by frequency and total duration of paternal incarceration is important because it directs attention to qualitative aspects of paternal incarceration that could be missed when analyzing paternal incarceration as a dichotomous event. Questions related to low-level offenders, who are incarcerated for comparatively brief periods and who experience few incarcerations, are especially intriguing. Existing research has found that paternal incarceration is most harmful to children when the fathers are low-level offenders (Wildeman and Western 2010). And although the current study cannot shed light on the causality of these harms (because obtaining the counterfactual observation would require experimental variation in incarceration risk on one hand and in duration of incarceration on the other), the dramatic penalty of paternal arrest for children in my sample does seem to point in the same direction. Results from Lageson (this volume) further show that online mugshots can haunt people who were arrested but not necessarily convicted and can prevent them from getting or keeping a job, which only seems to add to the unjust consequences of paternal (or maternal) criminal justice contact for children. The links

among paternal arrest, comparatively short paternal incarceration, and infrequent and short paternal incarceration and educational outcomes and criminality compared with the counterfactual of no, longer, or more frequent paternal incarceration need more rigid causal analysis to be firmly established, however.

Why is it, for example, that educational outcomes and criminality among children who experience frequent paternal incarcerations, irrespective of the duration of these incarcerations, differ substantially from the outcomes of children who experience few but durable paternal incarcerations, even when controlling for background characteristics? Perhaps these results indicate that it is as harmful for children to have fathers who move in and out of the criminal justice system even just for brief periods (and thus for less serious crimes), as it is to have fathers who end up serving long sentences. Existing research has found that paternal incarceration is associated with child behavioral problems, yet the question that materializes from my results is whether such child behavioral problems accumulate with frequency rather than duration of paternal incarceration. Research from the field of family instability and child well-being suggests that this could be the case: family instability—moving in and out of two-adult households—is especially damaging for children, and more so than prolonged mother-only care (e.g., Fomby and Cherlin 2007; Lee and McLanahan 2015). Also, Comfort (this volume) shows that short-term confinement (and community supervision) places great burdens on family members, burdens that differ substantially from the burdens of imprisonment. Short-term confinement destabilizes families, especially because of more or less explicit expectations that these family members act as caretakers for the newly released offender.

Frequency and total duration of paternal incarceration are, however, not the only qualitative aspects that could be important for children. The contact between fathers and their children (both prior to, during, and following these fathers' incarceration) for these children's outcomes is an important topic for future research. Incarcerated fathers vary greatly in the contact they have with their children, but one common trend is that their contact decreases during paternal incarceration (Geller 2013). Qualitative research suggests that this decrease in contact could be linked with logistic and financial challenges—prisons are often located far from the family home; transportation expenses burden the family budget, which, because of the incarceration, is based on a single income; and the inmate's partner may have to take time off to bring the child(ren) to visit the incarcerated father (Comfort 2008). But if increased contact between incarcerated fathers and their children would help to improve these children's outcomes—which future research should analyze—such logistic and financial challenges will need to be alleviated.

The timing of paternal incarceration is another important question for researchers to take up. Existing research distinguishes between distal and recent paternal incarceration (e.g., Geller 2013; Geller and Franklin 2014; Porter and King 2015), yet the question remains whether it matters more or less if children experience longer/shorter and frequent/infrequent paternal incarceration at different ages. We currently do not know whether the effects of frequency and duration of paternal incarceration vary by child developmental stages.

Appendix

TABLE A1
Means and Standard Deviations (in parentheses) of Background Characteristics, by Frequency of Paternal Incarceration

Variable	None	1	2	3	4	5+
Female	.486 (.500)	.509 (.500)	.484 (.500)	.509 (.500)	.442 (.500)	.516 (.500)
Ethnic minority	.052 (.222)	.132 (.338)	.113 (.317)	.111 (.315)	.099 (.299)	.081 (.273)
<i>Family type</i>						
Parents married	.519 (.500)	.424 (.494)	.386 (.487)	.313 (.464)	.247 (.432)	.233 (.423)
Parents divorced	.037 (.188)	.055 (.227)	.059 (.236)	.067 (.250)	.064 (.245)	.075 (.263)
Parents cohabiting	.871 (.336)	.769 (.422)	.706 (.456)	.638 (.481)	.590 (.493)	.549 (.498)
<i>Mother's background</i>						
Age	28.805 (4.586)	27.129 (4.922)	26.726 (5.057)	26.012 (4.905)	25.622 (4.893)	24.757 (4.826)
Years of education	11.649 (3.227)	10.090 (3.689)	9.851 (3.478)	9.541 (3.244)	9.744 (2.930)	9.367 (3.032)
Gross income	142.085 (76.679)	111.089 (69.731)	101.310 (72.421)	88.111 (69.812)	86.338 (68.638)	75.122 (74.674)
Earnings	115.567 (77.659)	83.869 (74.351)	72.984 (70.763)	62.307 (67.323)	59.123 (65.815)	49.812 (60.736)
Unemployment rate	.137 (.253)	.194 (.285)	.222 (.297)	.238 (.305)	.269 (.323)	.252 (.312)
Disability pension rate	.003 (.052)	.008 (.086)	.007 (.083)	.012 (.083)	.009 (.092)	.004 (.060)
Sick leave benefit rate	.009 (.056)	.014 (.070)	.015 (.074)	.014 (.069)	.012 (.068)	.016 (.084)
Previously convicted	.032 (.177)	.083 (.276)	.123 (.329)	.154 (.361)	.154 (.362)	.263 (.440)
<i>Father's background</i>						
Age	29.265 (9.952)	27.004 (10.985)	26.291 (11.182)	25.037 (11.458)	23.020 (12.008)	21.024 (12.284)
Years of education	11.129 (4.602)	9.219 (5.011)	8.854 (4.930)	8.160 (4.980)	7.569 (5.002)	6.645 (4.942)
Gross income	199.585 (149.054)	143.215 (157.410)	124.711 (100.927)	118.021 (99.603)	99.326 (89.111)	75.649 (91.699)
Earnings	163.670 (118.882)	113.660 (105.531)	95.599 (96.093)	84.470 (90.843)	75.279 (87.561)	53.541 (75.807)
Unemployment rate	.064 (.177)	.142 (.259)	.186 (.288)	.208 (.297)	.227 (.317)	.224 (.296)
Disability pension rate	.004 (.058)	.011 (.101)	.011 (.099)	.016 (.123)	.006 (.075)	.004 (.062)
Sick leave benefit rate	.009 (.054)	.018 (.078)	.022 (.093)	.024 (.092)	.024 (.100)	.022 (.088)
Previously convicted	.094 (.292)	.270 (.444)	.386 (.487)	.451 (.498)	.523 (.500)	.593 (.492)
Missing in registry	.075 (.264)	.108 (.310)	.119 (.323)	.141 (.349)	.186 (.390)	.229 (.420)
Missing edu. reg. only	.039 (.193)	.085 (.278)	.081 (.273)	.092 (.289)	.081 (.274)	.097 (.296)
N	56,017	3,274	1,248	566	344	814

TABLE A2
Means and Standard Deviations (in parentheses) of Background Characteristics, by Total Duration of Paternal Incarceration

Variable	None	Arrest only	< 3 months	3–12 months	12+ months
Female	.486 (.500)	.509 (.500)	.480 (.500)	.495 (.500)	.526 (.500)
Ethnic minority	.052 (.222)	.132 (.338)	.096 (.295)	.116 (.321)	.090 (.286)
<i>Family type</i>					
Parents married	.519 (.500)	.429 (.495)	.320 (.467)	.265 (.442)	.218 (.413)
Parents divorced	.037 (.188)	.053 (.223)	.062 (.241)	.079 (.270)	.092 (.289)
Parents cohabiting	.871 (.336)	.768 (.422)	.662 (.473)	.577 (.495)	.509 (.500)
<i>Mother's background</i>					
Age	28.805 (4.586)	27.089 (4.930)	26.141 (5.010)	25.532 (4.993)	24.910 (4.870)
Years of education	11.649 (3.227)	10.083 (3.652)	9.781 (3.260)	9.318 (3.247)	9.183 (3.195)
Gross income	142.085 (76.679)	110.664 (70.366)	94.610 (70.230)	83.026 (80.829)	66.518 (66.440)
Earnings	115.567 (77.659)	83.147 (74.439)	68.708 (68.416)	52.520 (62.294)	41.834 (56.698)
Unemployment rate	.137 (.253)	.197 (.289)	.233 (.300)	.240 (.305)	.274 (.318)
Disability pension rate	.003 (.052)	.007 (.082)	.006 (.076)	.016 (.125)	.008 (.091)
Sick leave benefit rate	.009 (.056)	.013 (.068)	.015 (.073)	.015 (.078)	.021 (.098)
Previously convicted	.032 (.177)	.089 (.285)	.128 (.334)	.230 (.421)	.293 (.456)
<i>Father's background</i>					
Age	29.265 (9.952)	27.012 (10.603)	25.071 (11.949)	23.055 (12.413)	20.118 (13.051)
Years of education	11.129 (4.602)	9.283 (4.927)	8.360 (5.028)	6.885 (5.040)	6.097 (4.954)
Gross income	199.585 (149.054)	143.024 (102.839)	116.693 (190.871)	89.860 (92.993)	62.274 (88.004)
Earnings	163.670 (118.882)	113.058 (102.735)	89.080 (96.817)	59.984 (81.224)	42.351 (71.561)
Unemployment rate	.064 (.177)	.150 (.265)	.194 (.290)	.236 (.314)	.208 (.291)
Disability pension rate	.004 (.058)	.009 (.091)	.013 (.111)	.010 (.092)	.011 (.100)
Sick leave benefit rate	.009 (.054)	.018 (.079)	.022 (.085)	.032 (.112)	.021 (.098)
Previously convicted	.094 (.292)	.278 (.448)	.426 (.495)	.584 (.494)	.620 (.486)
Missing in registry	.075 (.264)	.100 (.300)	.150 (.357)	.195 (.397)	.267 (.443)
Missing edu. reg. only	.039 (.193)	.084 (.277)	.079 (.270)	.119 (.324)	.100 (.301)
N	56,017	3,616	1,732	430	468

TABLE A3

Means and Standard Deviations (in parentheses) of Background Characteristics, by Frequency and Total Duration of Paternal Incarceration

Variable	None	Low freq./Low dur.	Low freq./High dur.	High freq./Low dur.	High freq./High dur.
Female	.486 (.500)	.501 (.500)	.523 (.501)	.488 (.500)	.516 (.500)
Ethnic minority	.052 (.222)	.125 (.331)	.164 (.371)	.103 (.305)	.080 (.272)
<i>Family type</i>					
Parents married	.519 (.500)	.417 (.493)	.333 (.473)	.296 (.457)	.207 (.406)
Parents divorced	.037 (.188)	.053 (.223)	.128 (.335)	.071 (.256)	.070 (.255)
Parents cohabiting	.871 (.336)	.756 (.430)	.656 (.476)	.642 (.480)	.498 (.500)
<i>Mother's background</i>					
Age	28.805 (4.586)	27.032 (4.963)	26.699 (4.937)	25.739 (4.878)	24.703 (4.860)
Years of education	11.649 (3.227)	10.063 (3.618)	9.154 (3.862)	9.654 (3.144)	9.250 (2.974)
Gross income	142.085 (76.679)	109.788 (70.417)	77.359 (67.915)	87.911 (69.577)	71.514 (75.059)
Earnings	115.567 (77.659)	82.379 (73.645)	47.278 (62.273)	62.224 (67.249)	45.395 (57.527)
Unemployment rate	.137 (.253)	.200 (.288)	.235 (.296)	.242 (.309)	.266 (.316)
Disability pension rate	.003 (.052)	.007 (.079)	.030 (.171)	.007 (.085)	.007 (.086)
Sick leave benefit rate	.009 (.056)	.014 (.069)	.023 (.105)	.014 (.071)	.016 (.084)
Previously convicted	.032 (.177)	.090 (.287)	.179 (.385)	.155 (.362)	.286 (.452)
<i>Father's background</i>					
Age	29.265 (9.952)	26.909 (10.933)	24.566 (13.087)	24.194 (11.531)	20.401 (12.592)
Years of education	11.129 (4.602)	9.196 (4.973)	7.386 (5.088)	8.043 (4.928)	6.176 (4.928)
Gross income	199.585 (149.054)	140.063 (145.700)	94.737 (98.761)	110.134 (96.249)	68.795 (89.110)
Earnings	163.670 (118.882)	110.787 (103.530)	61.832 (86.292)	81.341 (88.742)	46.630 (72.321)
Unemployment rate	.064 (.177)	.152 (.265)	.218 (.323)	.219 (.305)	.220 (.293)
Disability pension rate	.004 (.058)	.010 (.098)	.027 (.146)	.010 (.095)	.007 (.079)
Sick leave benefit rate	.009 (.054)	.019 (.079)	.032 (.136)	.023 (.093)	.024 (.090)
Previously convicted	.094 (.292)	.293 (.455)	.508 (.501)	.469 (.499)	.634 (.482)
Missing in registry	.075 (.264)	.107 (.310)	.185 (.389)	.154 (.361)	.251 (.434)
Missing edu. reg. only	.039 (.193)	.083 (.276)	.097 (.297)	.082 (.274)	.109 (.312)
N	56,017	4,327	195	1,063	661

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