

**Title:**

**Maternal Incarceration and Children's Long-Term Outcomes: Timing versus Dosage?**

## **Abstract**

The study examines the differential effects of maternal incarceration by timing and dosage on adolescent children's high school dropout rate as well as on the rate of admission to a correctional institution. I use data on 9,563 children who are between the ages of 5 and 17 when their mothers enter either jail or prison during 1993 and 2001. Using a sibling pair sample to control for unobserved maternal characteristics, I find that exposure to maternal incarceration during late adolescence is associated with higher high school dropout rates for both sons and daughters than exposure to maternal incarceration during middle childhood. However, results indicate that only daughters are sensitive to varying dosages of maternal incarceration measured by the number of incarcerations in jail and in prison. Frequent maternal incarcerations in jail are associated with better long-term outcomes for girls, while the opposite is true for incarcerations in prison.

## **Introduction**

The number of females entering jail or prison has increased by more than fivefold from 1985 to 2006 (Giliard and Beck 1996; Sabol, Minton, and Harrison 2007). This rapid rise is not an indicator of the increased dangerousness of women; crimes of violence by women have remained relatively constant. The increase in the female jail or prison population is primarily due to the implementation of mandatory sentencing, the use of imprisonment and extended sentences for drug offenses, along with the disregard of gender considerations in courts (Hanlon et al. 2005). Currently, it is estimated that there are more than 200,000 women incarcerated in jail or prison on any given day who are mothers to about 300,000 minor children (Sabol, Minton, and Harrison 2007). Children of incarcerated mothers are believed to be at an increased risk of experiencing multiple risk factors including poverty, academic failure, parental substance abuse, and numerous home and school displacements (Dallaire 2007a; Wildeman 2007). The risk of entering foster care has become so large for children of incarcerated mothers that changes in the female incarceration rate are estimated to explain 31 percent of the increase in foster care caseloads between 1985 and 2000 (Swann and Sylvester 2006). However, there are still no policies and programs targeting this specific subgroup of children in the entire U.S.<sup>1</sup>

---

<sup>1</sup> There are policies and programs targeting the family of the offender (which sometimes include their children) in some states. An example would be the Family Support Program (FSP) developed by the Texas Department of Corrections and the University of Texas at Austin School of Social Work in 1992 which is a community-based rehabilitation effort for offenders, their families including children, and the community (Johnson, Selber, and Lauderdale 1998). However, these programs generally serve a very small fraction of the incarcerated population with limited resources available to children.

Despite the rapid growth in maternal incarceration, the literature examining the impact of maternal incarceration on children is relatively limited. Of the studies that do exist, most examine the behavioral or education outcomes of children for relatively short time periods. For example, Cho (*forthcoming*) examines the effect of having an imprisoned mother on children's reading and math test scores between third and eighth grade. Hanlon et al. (2005) examine the effect of having drug addicted imprisoned mothers on nine- to fourteen-year-old children's adjustment. Hagen and Myers (2003) examine the effect of secrecy on six- to thirteen-year-old children whose mothers were currently incarcerated, while Poehlmann (2005a; 2005b) studies the attachment relationships and intellectual outcomes of two- to seven-year-olds during their mother's imprisonment. While these earlier research provide convincing evidence of the impact of maternal incarceration incidents on a wide range of child outcomes, its implications are limited since they usually focus on short-term outcome measures of children within a narrow age range.

There are a couple of studies that examine the long-term outcomes of parental incarceration on children. Murray and Farrington (2005) investigate the effect of parental incarceration on eleven antisocial and delinquent outcomes of 23 London males between the ages of 14 and 40. It is the first study to use longitudinal data and employ an appropriate comparison group strategy. However, the study is not able to identify the effect of maternal incarceration since only 3 of the 23 sample boys have a mother entering prison (20 boys have imprisoned fathers). Furthermore, since the sample children only experience parental incarceration during the first ten years of their lives, it does not provide information on the effect of parental incarceration during later stages of children's development. More recently, Foster and Hagan (2007) examine the impact of having a biological father incarcerated either in jail or

prison on a measure of social exclusion constructed from information on housing, health, and political participation during adolescence and early adulthood. They identify a cumulative process of intergenerational disadvantage that begins with the father's incarceration and low educational attainment, continues on with children's low educational attainment, and results in forms of emerging social exclusion. However, Foster and Hagan (2007)'s study fall short of addressing the effects of the timing, frequency, and duration of incarceration which may be consequential in determining intergenerational effects. And more importantly, they only examine the effect of paternal incarceration which is expected to be different from the effects of maternal incarceration (Cho *forthcoming*; Dallaire 2007b; Johnson and Waldfogel 2004; Mumola 2000).<sup>2</sup>

The present paper represents the first systematic attempt to examine the differential effects of maternal incarceration by the timing of the event relative to one's developmental stage controlling for various dosages of incarceration. The two outcome measures examined are dropout rate and the rate of admission to a correctional institution in high school.<sup>3</sup> I examine the

---

<sup>2</sup> The effects of parental incarceration are not expected to be uniform across gender due to the difference in children's care-giving arrangement that immediately follow the event. Studies report that the majority of children of incarcerated fathers tend to live with their mothers after incarceration, while children of incarcerated mothers mostly live with relatives outside the home.

<sup>3</sup> These two measures represent different aspects of child development, where the former represents an attainment-related outcome and the latter a behavioral one. The effect of maternal incarceration may depend on the attributes of the outcome examined. A recent study examining the consequences of poverty between a child's prenatal year and fifth birthday finds that early poverty has detrimental effects on a number of attainment-related outcomes (adult earnings,

effect of maternal incarceration on children's outcome measures during three distinct developmental stages: middle childhood from ages 5 to 10; early adolescence from ages 11 to 14; and late adolescence from ages 15 to 17 (Eccles 1999). In order to control for the differences in the dosage of incarceration, I control for (1) the number of days of maternal incarceration in either jail or prison; (2) the number of maternal incarcerations in either jail or prison; (3) and the number of maternal incarcerations in prison.

This paper contributes to the literature in a few important ways. The most basic addition is that I use a large population-based sample that contains detailed information of the mother's demographic characteristics as well as her prior history with the social welfare services and correctional facilities in Illinois. The data also include information on the demographic characteristics and high school outcome measures of children who experience maternal incarceration over a wide age range from 5 to 17. This enables me to examine the effect of maternal incarceration by timing as well as by the length, frequency, and severity of the incarcerations for both boys and girls. In addition, insofar as dropping out of school and/or entering a correctional institution during adolescence serves as a strong indicator of becoming disadvantaged later on, the paper estimates important long-term effects of maternal incarceration on minor children. Finally, the paper exploits the fact that the data contain siblings, and employs a mother fixed-effect approach to account for unobserved household level factors.

## **Background and Conceptual Framework**

---

work hours, receipt of transfer income) but not on behavioral outcomes such as out of wedlock childbearing and arrests (Duncan et al. 2008).

I draw on theories spanning a variety of social science disciplines to inform hypothesis about how maternal incarceration can affect children's long-term outcomes. From the perspective of economic theory, parental incarceration (as any other event that imposes a time constraint on child care investments) can affect children's development by influencing the amount and distribution of parental time investments (Becker 1981). All else being equal, then, one would expect the negative (or positive) effects of maternal incarceration to increase as the length or frequency of incarceration increases because it would result in less available time for children. Developmental psychology pays attention to the timing of changes in mother-child relationships and family life across a child's developmental lifespan. An event like maternal incarceration may have very different effects on adolescents than on infants due to differences in developmental tasks (Johnston 1995; Myers et al. 1999). Sociological theory points to the mechanism by which maternal incarceration can affect interactions between the mother and her children. The socialization process of children with incarcerated mothers may be negatively affected by the lack of parental supervision, social role models, and support (Hagan and Dinovitzer, 1999). It is also possible that the preexisting contextual risk factors as well as the incarceration-related risk factors are intensified with the experience of maternal incarceration (Dallaire 2007b; Foster and Hagan 2007).<sup>4</sup>

---

<sup>4</sup> Contextual risk factors include mother's lack of education, being from a single parent home, being in a large family, being an ethnic minority, and having a parent with a mental illness. Incarceration-related risk factors are risk factors that are unique to the experience of parental incarceration or criminal behavior include siblings being separated from each other due to parental incarceration, having both parents incarcerated, or children being placed in nonfamilial care (Dallaire 2007b).

I empirically test two implications of the above theories using a rich population-based dataset. The conceptual framework and prior research relating to the two hypotheses are explained in detail below.

### Timing Effect

The notion that children may react differently to change or intervention by developmental and social stages is not novel. There are numerous studies examining the development of children by different age groups, attempting to better identify the developmental tasks or conflicts to be resolved for each stages of development (Eccles 1999; Erickson 1968). As developmental psychologists would suggest, then, children may well have different effects of maternal incarceration by the timing of the mothers' incarceration relative to their own developmental stages.

Theory suggests that children in their infancy are less likely to experience direct effects of parental incarceration on their physical and intellectual development, but may suffer from parent-child separation since they are developing attachment and trust during these periods (Dallaire 2007a; Johnston 1995; Poehlmann 2005a). Children in their early childhood (from ages 2 to 7) may also suffer from parent-child separation as well as the trauma of experiencing parental criminal activity and arrest, while children in their middle childhood (from ages 8 to 11) may experience low self-esteem or poor self-concept as they struggle in developing a sense of autonomy and individuality (Eccles 1999; Johnston 1995). Finally, adolescent children may display an increased level of aggression or maladaptive coping mechanisms which could eventually lead to school dropout, delinquency, or adult crime (Dallaire 2007a; 2007b; Eccles 1999; Johnston 1995).

It is not clear based on prior research or theory as to which developmental stage is the most crucial in determining the impact of maternal incarceration. Johnston (1995), for example, argues that the long-term effects of parental incarceration should be the worst for children in the stages of early childhood between the ages of 2 and 6 since they will have the ability to perceive and remember the event but without the ability to process or adjust to the trauma. On the other hand, others argue that maternal incarceration is most detrimental to children in adolescence since they are developing orientations and motivations for achievement while actively internalizing their parent's values and behaviors through observational learning (Mead 1997). They find that the reason maternal (or parental) incarceration has larger effects on older children is because these children usually suffer from trauma induced by an accumulation of years of poverty, abuse, neglect, molestation, community violence, multiple placements, and parent-child separation as well as the effect of incarceration itself (Myers et al. 1999). It is also possible that older children may have to assume unexpected responsibilities and be diverted from school in order to conserve and supplement household income (Foster and Hagan 2007).

The first hypothesis that I examine relates to this idea of differential effects by children's developmental stages. I hypothesize that maternal incarceration will have stronger effects on dropping out of school or engaging in criminal behavior as measured by institutionalization in correctional facilities when experienced at an older age. I test the differential effects of maternal incarceration during three developmental stages, namely middle childhood, early adolescence, and late adolescence. It is important to note that due to data limitations I am not able to test the effect of maternal incarceration for children who are below the age of five at the timing of their mother's incarceration. This is a limitation given that there are studies suggesting this period to be the most crucial in determining one's long-term outcomes (Johnston 1995).

## Dosage Effect

Incarceration is not a uniform event. The impact of maternal incarceration on children may differ not only by the timing of the event, but also by the amount of time spent separated due to incarceration as well as by its frequency. I refer to the latter as the “dosage effect”.

The dosage effect of maternal incarceration may exist simply because maternal incarceration imposes greater financial constraints on children as the length of incapacitation increases, all else being equal (Wildeman 2007). There are likely other influences of maternal incarceration that varies with the level of dosage. For example, a child whose mother is incarcerated repeatedly for long periods may experience larger emotional stress or frequent changes in his or her living situation than a child whose mother is incarcerated only once for a relatively short time period. Children whose mothers are incarcerated for committing murder may suffer higher levels of shame or stigma than children whose mothers are incarcerated for driving under the influence.

The difference in the “dosage” of incarceration is partially reflected in the two types of incarceration – jail versus prison. Jails are locally operated correctional facilities that confine people before or after adjudication. About half of the inmates sentenced to jail are convicted of their crime and usually have a sentence of a year or less. They are admitted for light felonies, misdemeanors, or probation violations. On the other hand, mothers who are incarcerated in prison are those who have been tried in court, convicted of their crime, and have a sentence of more than a year. Because they are housed in jail prior to the disposition of their case or sentencing, they all have a jail incarceration record prior to their prison record. Inmates in prison generally have longer sentences than inmates in jail and are committed for more serious crimes. They are also housed farther away from their children possibly resulting in limited contact during

incarceration as well as higher costs to maintain communication (Wildeman 2007).<sup>5</sup> Therefore, children whose mothers enter prison are on average experiencing greater dosages of maternal incarceration than children whose mothers enter local jail.

I hypothesize that the effect of maternal incarceration on children's long term outcomes should increase as the dosage of incarceration increases. The dosage of incarceration is measured by three variables: (1) the number of days of maternal incarceration in either jail or prison; (2) the number of maternal incarcerations in either jail or prison; (3) and the number of maternal incarcerations in prison. These three dosage measures capture the length of separation between the child and the mother due to incarceration, the frequency of the event, and the stigma of having a mother incarcerated in prison.<sup>6</sup>

The dosage effect may or may not be sensitive to the timing of maternal incarceration. Theoretically, if children's outcomes are sensitive to the timing of maternal incarceration, one may expect the dosage level during that particular developmental stage to also be important. However, it is possible that the timing effect is independent of dosage or that total dosage during childhood is more important than any time-specific dosage. To incorporate these different mechanisms, I estimate the effect of maternal incarceration once controlling for the time-specific dosage measures and again controlling for a measure of the total dosage during each childhood developmental stage.

---

<sup>5</sup> This is usually the case since there are fewer female prisons than jails in a given state and they are generally farther away from large residential areas.

<sup>6</sup> Each variable measuring the dosage effect is based on maternal incarceration experiences during childhood, namely between the ages of 5 and 17. I exclude information on maternal incarcerations that are experienced after the age 17.

The association between dosage of maternal incarceration and children's outcome may occur if mothers are prohibited from providing adequate support or resources to their children due to longer prison stays, frequent incarcerations, and/or the stigma or trauma from serving time in prison for a serious crime. If the above hypothesis is true, I should find in the following analyses that children with greater dosages of maternal incarceration are more likely to experience negative outcomes such as dropping out of school or committing a crime themselves. On the other hand, if the parenting quality or the level of support a mother provides does not differ by dosage (at least not enough to change children's long-term outcomes), there may well be no difference in the estimated effect.

### **Analytic Approach**

The differential effects of maternal incarceration on children's high school dropout and admission to correctional institution are estimated for three developmental stages controlling for differences in the dosage of incarceration. Since exposure to maternal incarceration during a certain developmental stage is correlated with exposure to incarceration during other developmental stages, I control for all exposures to incarceration by developmental stages during the observable time period.<sup>7</sup>

---

<sup>7</sup> Correlation between developmental stages is negative since female incarceration is generally a one-time, relatively short term event (Cho, forthcoming). The correlation coefficient between exposure to maternal incarceration during middle childhood and early adolescence is -0.24, during middle childhood and late adolescence -0.34; and during early adolescence and late adolescence is -0.32.

I begin with a reduced-form specification using a Linear Probability Model (LPM) to model outcome  $y$  for adolescent  $i$  with a mother  $m$ . The effect of maternal incarceration is estimated controlling for a matrix of mother-specific ( $X$ ) and individual-specific ( $Z$ ) factors:

$$y_{im} = \alpha X_m + \beta Z_{im} + \gamma Inc_{im} + \varepsilon_{im} \quad (1)$$

where  $Inc_{im}$  represents a measure of maternal incarceration for child  $i$  with a mother  $m$ . Maternal incarceration ( $Inc_{im}$ ) is specified to capture both the timing and dosage effect. Specifically, it includes a set of indicator variables denoting whether child  $i$  was exposed to maternal incarceration during the three developmental stages (“timing effect”) as well as a set of variables that denote the length, frequency, and severity of the mother’s incarceration (“dosage effect”).<sup>8</sup> The error term ( $\varepsilon_{im} = b_i + v_{im}$ ) is specified to have a mother-specific component ( $b_i$ ) that is constant across siblings and an individual-specific component ( $v_{im}$ ) that is independent and stationary conditional on observed factors.

Eq. (1) yields unbiased and consistent estimates of  $\gamma$  if there are no unobserved factors that create an association between either the timing or dosage of maternal incarceration and children’s outcomes such as dropping out of high school or being admitted to a correctional institution by age 17. However, this condition is unlikely because children exposed to maternal incarceration are also exposed to other contextual risk factors within the household, such as single parenting, poverty, abuse and neglect, or parental health problems (Dallaire 2007b). To account for such concerns, a mother fixed-effects approach is employed. This approach uses a sibling sample to control for unobserved factors that are constant across children who have the same mother. Sibling comparisons have been conducted by many social scientists to estimate the

---

<sup>8</sup> As mentioned in the previous section, I allow the dosage effect to be both time-sensitive and time-insensitive.

effect of social interventions on children (Currie and Cole 1993; Currie and Thomas 1995; Ku and Plotnick 2003). However, this is the first attempt to apply this technique to children whose parents are incarcerated.

I follow the standard approach and difference Eq. (1) across siblings  $i$  and  $j$  with mother  $m$ :

$$y_{im} - y_{jm} = \beta(Z_{im} - Z_{jm}) + \gamma(Inc_{im} - Inc_{jm}) + (v_{im} - v_{jm}) \quad (2)$$

The effect of unobserved mother-specific factors ( $\alpha X_m$ ) has been differenced away and the effect of maternal incarceration is estimated only through variation in observed factors across siblings.

This means that  $\gamma$  should not suffer from bias due to some constant unobserved mother or household level characteristic. The strategy of differencing variables across all possible sibling pairs as opposed to demeaning Eq. (1) is chosen since there are many children with 3 or more siblings in the sample.<sup>9</sup>

Although using a mother fixed-effect model is an improvement from the cross-sectional model, it has its limitations. Because children who do not have siblings are excluded from the fixed-effect estimation, in order to generalize the results one must assume that children who have

---

<sup>9</sup> Differencing across siblings yields more observations than demeaning if the sample includes individuals with many siblings. Consider a sample of 16 children including 4 mothers who each has 4 children. The demeaning approach would create a sample of 16 observations (=4 demeaned observations\*4 mothers), while the sibling pair sample would contain 24 observations (=6 pair observations\*4 mothers). On the other hand, consider a sample of 16 children that includes 5 mothers who each have 2 children and 2 mothers who each have 3. In this case, the demeaning approach yields 16 observations (=4\*2+3\*1+5\*1), whereas the sibling pair approach only yields 11(=1\*5+3\*2).

siblings are not different from children who do not. In addition, if unobserved individual-specific characteristics ( $v_{im}$ ) are correlated with maternal incarceration and high school outcomes, the fixed-effect estimates may be biased. This is of particular concern in estimating the effect of maternal incarceration in adolescence since incarcerated mothers who are old enough to have adolescent children may be facing serious problems such as substance abuse or mental health issues that are not observed in the data but vary with time. If these problems are not permanent, the fixed-effect approach may attribute the detrimental effect of the transitory problems to exposure to maternal incarceration in adolescence. Finally, it is important to note that all children in the sample have experienced maternal incarceration at least once between the ages of 5 and 17. This means that the results are not intended to measure the causal effect of maternal incarceration, but rather the relative difference in children's long-term outcomes by the timing and dosage of maternal incarceration.

## **Data**

Data for this research come from the Chapin Hall Center for Children's Integrated Database which merged large administrative data from several government agencies including the Illinois Department of Corrections (IDOC), Cook County Jail (CCJ), Chicago Public Schools (CPS), Illinois Department of Employment Security (IDES), and other social and child welfare agencies in Illinois. The final sample consists of children who attend public schools in Chicago between academic years 1991 and 2003 whose mothers have been incarcerated in the IDOC or CCJ at least once during January 1, 1993 and June 30, 2001. It is important to note that in order for a woman and her child(ren) to be included in the sample, she must have had contact with social and children welfare services in Illinois in addition to her incarceration during this time

period. This means that she either received cash assistance (AFDC or TANF), Food Stamps, and/or Medicaid, or had contact with the foster care system. Due to these restrictions, our sample of women (mothers) is an economically disadvantaged group even among the female corrections population.

I observe the school enrollment records of children in the CPS between kindergarten and twelfth grade during September, 1991 and September, 2004. In order to be included in the final sample, the child must be at least 17 years of age by September, 2004, enrolled in the CPS, and have a mother who is incarcerated before his or her seventeenth birthday.<sup>10</sup> There are a total of 9,563 children with 6,591 mothers who meet the above criteria. The sibling sample for the mother fixed-effect analyses included among the 9,563 children those who also had a sibling(s) that fit the above criteria. The final number of sibling pairs is 4,009 pairs from 2,972 children and 2,177 mothers.

Descriptive statistics on all children as well as on children who have siblings are presented in columns (1) and (2) of Table 1. Comparing estimates in columns (1) and (2) suggest that the observed characteristics of children in the sibling sample are similar to the total sample. On average, children are observed to experience incarceration for the first time around the age of 12. They are disproportionately African-American (about 88 percent) and have mothers who were about 21 years old when they gave birth to that child. Incarcerated mothers, on average,

---

<sup>10</sup> The compulsory school attendance of children is addressed by Article 26 of the Illinois School Code. The law imposes an obligation on parents or custodians of any child between the ages of 7 and 17 years to cause their children to attend some public school in the district where the child resides for the duration of the regular school term. Recently, beginning with the 2007-2008 school year, the state has lowered the compulsory school age from 7 years to 5.

have about 4 children,<sup>11</sup> and almost half of the mothers are themselves high school dropouts. More than half of them are receiving cash assistance from state agencies, about 12-14 percent of them had contact with foster care agencies, and about 40 percent of them have never been employed during 1995 and 2001. Mothers are most commonly committed for drug-related crimes and property crimes, of which the two most popular offenses are drug possession and retail theft. The median mother is incarcerated in jail once and spends 16 days incarcerated during the years her child is a minor. This indicates that the dosage of maternal incarceration is quite small for the median child whose mother is incarcerated.

This study examines two long-term child outcome measures, namely high school dropout status and admission to a correctional institution. A student is defined as a dropout if s/he is at least 17 years of age in September, 2004 and has left the CPS system without graduating or transferring to a different educational institution.<sup>12</sup> Compared to the average dropout rate of

---

<sup>11</sup> The total number of kids increases only slightly when the sample is restricted to children who have siblings in the present data. This indicates that there are many children who are not included in the sibling sample either because we lack information on their siblings or because they were too young to be included in the analyses.

<sup>12</sup> I include information on children who are attending nontraditional schools such as alternative high schools and jail schools in the calculation of dropout status because about 23 percent of the sample children are enrolled in at least one of them. This is different from the way the official dropout rate is calculated in the CPS because they follow a formula set by the Illinois State Board of Education which does not require them to include information on nontraditional schools. This is to allow comparisons of dropout rate between the CPS and other Illinois school districts since these kinds of facilities only exist in the CPS.

students attending traditional Chicago public high schools, the sample children have very high dropout rates of about 50 percent.<sup>13</sup> A student is identified as entering a correctional institution if the student leaves the CPS (i.e. drops out) because s/he is legally committed to a non-CPS correctional institution. About 8 percent of the sample children are observed to enter a correctional institution during their adolescent years. This figure is consistent with Johnston's finding that from a sample of 100 women in California jail 11.4 percent of the children had been arrested, while 10 percent had been incarcerated (Johnston 1991).

## **Findings**

Table 2 presents results from estimating Eq. (1) for all children in the sample including children who have siblings and those who do not. The coefficients of maternal incarceration ( $Inc_{im}$ ) are estimated controlling for both child- and mother-level variables such as child's race and gender, mother's race, age at first incarceration, education level, number of children, offense type, receipt of cash assistance (AFDC or TANF), contact with foster care, and employment (see Appendix Table A for complete list of regression coefficients).

Column 1 and 3 of Table 2 present results of the effect of maternal incarceration during middle childhood, early adolescence, and late adolescence on dropping out of high school or being admitted to a correctional institution, controlling for differences in time-specific dosages. Children whose mothers are incarcerated during middle childhood are less likely to drop out of high school by 6.3 percentage points, compared to children who experience maternal incarceration during early or late adolescence. Likewise, children whose mothers are

---

<sup>13</sup> The average one-year dropout rate of CPS ranges between 15 and 17 percent during 1994 and 2000 (Allensworth and Easton 2001). The study examines dropout rate between 1991 and 2004.

incarcerated during late adolescence are more likely to drop out of high school by 9 percentage points.<sup>14</sup> These findings imply that maternal incarceration is more detrimental to children's academic achievement as they get older. In addition, according to the cross-sectional estimates, the dosage does not appear to be an important determinant of children's dropout rate – all three dosage variables are small and statistically not different from zero.

Similar patterns emerge when one looks at the rate of admission to a correctional institution. I find that children are more likely to be admitted to a correctional institution by the age of 17 if they experience maternal incarceration in their adolescence. However, unlike dropout rates, results are sensitive to the time-specific dosage of incarceration.<sup>15</sup> Coefficients of the number of incarcerations during middle childhood is negative and statistically significant suggesting that children are less likely to be admitted to correctional institutions as the number of

---

<sup>14</sup> Since the dosage effect variables in column 1 are not statistically significant and the two variables indicating the length and frequency of maternal incarceration are close to 0, the interpretation of the timing effect is not affected. This is similar to interpreting the effect of a treatment when the variable indicating treatment is interacted with another variable and the interaction term is not statistically significant and close to 0.

<sup>15</sup> The coefficient of the number of days incarcerated during early adolescence is also statistically significant but very small in magnitude. The actual estimate is .0000396, indicating that it would increase a child's rate of admission to a correctional institution by 0.4 percentage points if the mother is incarcerated for more than 10,000 days. There are few mothers who are incarcerated during a child's early adolescence for such a long time period.

maternal incarcerations experienced during this period increases.<sup>16</sup> The opposite pattern emerges for children's outcomes and the number of incarcerations experienced during late adolescence. As a result, the findings on admission to a correctional institution in column 3 of Table 2 can be interpreted as follows: Children who experience one maternal incarceration incident between the ages of 5 and 10 are 3.2 (= -2.6-0.6) percentage points less likely to be admitted to a correctional institution than children who experience maternal incarceration during other periods. On the other hand, children are 3.8 (= 2.7+1.1) percentage points more likely to be admitted to a correctional institution if their mothers are incarcerated once when they are between the ages of 15 and 17. In terms of magnitude, the timing effect during middle childhood is more than four times the size of the dosage effect, while it is more than double the size for late adolescence.

Column 2 and 4 of Table 2 present the differential effect of maternal incarceration by timing controlling for total dosage levels. Although there is still no dosage effect on dropout rates, the coefficients indicating timing effects have increased in absolute terms. Children whose mothers are incarcerated during middle childhood are 7.5 percentage points less likely to drop out, while children whose mothers are incarcerated during late adolescences are 9.6 percentage points more likely to drop out. The coefficients for the timing effect on admission to a correctional facility increases both in absolute magnitude and statistical significance as one controls for total dosage levels. Children whose mothers are incarcerated during middle childhood are 3.6 percentage points less likely to enter a correctional institution, while children whose mother are incarcerated during late adolescence are 4.8 percentage points more likely to.

---

<sup>16</sup> This relationship exists because time-specific dosages of maternal incarceration are negatively correlated across developmental stages. If a mother enters jail twice during the child's middle childhood, the probability of the mother being incarcerated again in later periods is much lower.

Children whose mothers are incarcerated during early adolescence are on average 1.5 percentage points more likely to enter a correctional institution than others. However, the variable measuring the total number of maternal incarcerations is close to 0 and no longer statistically significant.<sup>17</sup> This is because the opposite directions of the two time-specific dosage effects during middle childhood and late adolescence cancel each other out.

Table 3 presents estimates for the mother fixed-effect model controlling for both the time-specific and total dosage of maternal incarceration. Children exposed to maternal incarceration during middle childhood are less likely to drop out, while children exposed to maternal incarceration during late adolescence are more likely to drop out. However, as one controls for unobserved maternal household characteristics, the effect of the number of incarcerations on high school dropout rate becomes negative and at least marginally significant. As a result, a child whose mother is incarcerated once during middle childhood is about 11 (= -7.4-3.7) percentage points less likely to drop out, while a child whose mother is incarcerated once during late adolescence is about 5 (= 9.6-4.7) percentage points more likely to drop out. This pattern holds true when total dosage of maternal incarceration is controlled for in column 2. On average, I find that each additional event of maternal incarceration decreases the rate of dropout by 3.3 percentage points.

---

<sup>17</sup> The variable measuring the total number of days of maternal incarceration is close to 0 and statistically significant at the 5 percent level. The precise coefficient estimate is .0000265, indicating that the rate of admission to a correctional facility would be 0.3 percentage points higher for children whose mothers are incarcerated for about 27.4 years (10,000 days). There are few mothers who are incarcerated for such long time periods.

The effect of maternal incarceration on children's admission to correctional institutions decreases both in magnitude and statistical significance in the fixed-effect model. The dosage effect disappears, while the timing effect during middle childhood is only marginally significant. Children whose mothers are incarcerated during middle childhood are 3.5 percentage points less likely to enter a correctional institution, while children whose mothers are incarcerated during late adolescence are 3.6 percentage points more likely to.

Do the timing or dosage effects of maternal incarceration differ for sons compared with daughters? Table 4 shows results from the fixed effect models estimated separately by gender. Prior findings show that adolescent daughters are under special pressure and are at greater risk of homelessness when their biological fathers are incarcerated usually because of their abusive relationship with the adult male figure that enters their lives following the incarceration (Foster and Hagan 2007). Research also finds that boys exposed to parental imprisonment during the first 10 years of their life are more likely to engage in antisocial and delinquent behavior between ages 14 and 40 than four other comparison groups of boys – boys who did not experience separation, boys who were separated by hospital or death, boys who were separated for other reasons (usually disharmony), and boys whose parents were only imprisoned before their birth (Murray and Farrington 2005).

The results reported in Table 4 suggest that only the timing effect of maternal incarceration is present for sons. The magnitude of the timing effect on high school dropout rate suggests that the difference in dropout rates between boys who are exposed to maternal incarceration during different developmental stages may be as large as 18.5 percentage points. The timing effect of maternal incarceration is also present for sons' rate of admission to correctional institutions – although the estimates are no longer statistically significant due to the

decreased sample size. On the other hand, the timing of maternal incarceration does not seem to have as strong an effect on daughters.<sup>18</sup> Rather, the dosage of maternal incarceration has a much more pronounced effect on both the high school dropout rates and the rate of admission to correctional institutions. Specifically, daughters are sensitive to the number of incarcerations either in jail or prison as well as to the number of incarcerations in prison. Closer examination of the coefficients of the number of incarcerations either in jail or prison and of the number of incarcerations in prison reveal that frequent maternal incarcerations in jail actually decreases high school dropout rates as well as the rate of admission to correctional institutions, while frequent maternal incarcerations in prison has the opposite effect.<sup>19</sup>

In sum, based on the fixed-effect model estimates using the sibling pair sample, both the timing and dosage effects of maternal incarceration on children's high school dropout rates are statistically significant and large. These two effects operate in the same direction for children exposed to maternal incarceration during middle childhood, whereas they operate in opposite directions for children in late adolescence. Further analysis indicates that the timing and dosage effects of maternal incarceration are sensitive to a child's gender. That is, sons are more

---

<sup>18</sup> There is a marginally significant effect of maternal incarceration for daughters in late adolescence. However, there is no timing effect for daughters on the rate of admission to correctional institutions.

<sup>19</sup> This is because the coefficient of the number of maternal imprisonments is positive and much larger in absolute terms than the negative coefficient of the number of maternal incarcerations either in jail or prison. As a result, a girl whose mother enters prison once during her late adolescence is 8.7 (=18-9.3) percentage points more likely to drop out, while a girl whose mother enters jail once during her late adolescence is 9.3 percentage points less likely to drop out.

susceptible to the timing effect, while daughters are driving the dosage effect. Next, results on children's rate of admission to a correctional institution suggest that the admissions rate increases as the age of the child exposed to maternal incarceration increases but that it is not sensitive to the dosage of maternal incarceration. However, closer examination of the effects on the rate of admission to correctional institutions reveal that sons are only sensitive to the timing of maternal incarceration, while daughters are only sensitive to the dosage of maternal incarceration.

## **Discussion and Conclusion**

Is there a timing effect of maternal incarceration on long-term children's outcomes? Is there a dosage effect of maternal incarceration on long-term children's outcomes? The answer depends on the outcome at hand as well as on the gender of the child. In terms of attainment-related outcomes represented by high school dropout rate, I find that both the timing and dosage of maternal incarceration are crucial in determining a daughter's long-term outcome, while only the timing matters for sons. Both sons and daughters are more likely to drop out of high school if they are exposed to maternal incarceration in adolescence than in middle childhood. This confirms the first hypothesis that the effect of maternal incarceration is greater for adolescent children all else equal. On the other hand, daughters are less likely to drop out of high school as the number of maternal incarcerations increases and as the number of maternal imprisonments decreases. This suggests that at least for daughters the severity of incarceration matters. It appears that having a mother enter jail decrease a girl's dropout rate, while having a mother enter prison increases it. As a result, the second hypothesis that assumes larger negative effects for

larger dosages of maternal incarceration is not confirmed. The dosage effect of maternal incarceration appears to be nonlinear and gender-specific.

Results on children's behavioral outcome represented by the admission rate to a correctional institution as adolescents also suggest that the timing of maternal incarceration is important in determining children's long-term behavioral outcomes. However, further analysis reveals that the timing effect is present only for sons, while the dosage effect is present only for daughters. Using the sibling pair sample, I find that sons are more likely to enter a correctional institution if maternal incarceration occurs in their late adolescence. Daughters are more likely to enter a correctional institution as the number of maternal incarcerations in jail decreases and as the number of maternal incarcerations in prison increases. This suggests that, similar to the attainment-related outcome, the dosage effect of maternal incarceration on behavioral outcomes is nonlinear and gender-specific.

Finding differential effects of maternal incarceration by timing confirms the usefulness of the life-course framework. The pattern of results across developmental stages is consistent with the explanations that adolescent children have been exposed to multiple risk factors prior to maternal incarceration and thus are more prone to psychologically suffer from its stigma. Adolescents may suffer most from the negative role model provided by the mother or from the lack of parental supervision. It is also possible that developmentally younger children are more resilient to adverse events than are older children.

The finding that frequent incarcerations in jail are associated with better attainment-related as well as behavioral outcomes for daughters is more difficult to comprehend. Although it is beyond the scope of this paper to fully understand the relationship, I offer a potential explanatory factor in an attempt to direct future inquiries into this topic. It is possible that there

is an omitted factor that is correlated with both the number of maternal incarcerations in jail and the daughter's likelihood of dropping out of high school or of being admitted to a correctional institution. For example, if daughters whose mothers are frequently incarcerated in jail are more likely to be removed from the mother's care and instead be placed in a higher quality kinship care which in turn results in better child outcome measures, frequent jail incarcerations may have a beneficial effect on daughters' long-term outcomes. This scenario, however, makes a couple of unwarranted assumptions – that only daughters benefit from change in the care giving arrangement and that mothers incarcerated in prison do not have an equally supportive kinship network than mothers incarcerated in jail. Obviously, further investigation on this topic is warranted.

Although this study has not isolated the reasons why differences in children's outcomes occur by the timing or dosage of maternal incarceration, it still points to the importance of considering these two different sources of effect in policy debates. Also, finding different effects between sons and daughters implies that studies should be appropriately designed to measure the effect of maternal incarceration separately by children's gender as well as by the timing and dosage of maternal incarceration. Future research should also examine the role of alternative care-givers as mediators of the effect as well as the role of economic deprivation in determining the effect of maternal incarceration to provide adequate intervention.

## Appendix

Appendix Table A. Effect of Maternal Incarceration on High School Dropout Rate and Admission to Correctional Institution: Cross Sectional Estimates (continues from Table 2)

Outcome	High School Dropout		Admission to Correctional Institution	
	(1) Model 1	(2) Model 2	(3) Model 1	(4) Model 2
<i>Characteristic of Children:</i>				
Female	-0.114*** (0.011)	-0.115*** (0.011)	-0.139*** (0.005)	-0.139*** (0.005)
Gender missing	-0.167*** (0.023)	-0.167*** (0.023)	-0.098*** (0.011)	-0.099*** (0.011)
Black	0.048 (0.053)	0.047 (0.053)	0.011 (0.023)	0.012 (0.023)
Hispanic	0.070 (0.043)	0.070 (0.043)	0.005 (0.019)	0.005 (0.019)
Other race	0.021 (0.044)	0.021 (0.044)	0.022 (0.021)	0.023 (0.021)
<i>Characteristic of Mother:</i>				
Age at first incarceration	-0.0002 (0.001)	-0.0002 (0.001)	-0.002*** (0.001)	-0.002*** (0.001)
1 child	0.033 (0.033)	0.034 (0.033)	-0.004 (0.013)	-0.003 (0.013)
2 children	0.009 (0.030)	0.010 (0.030)	0.008 (0.012)	0.009 (0.012)
3 or more children	0.056** (0.028)	0.057** (0.028)	0.020* (0.011)	0.021* (0.011)
Black	0.060 (0.051)	0.061 (0.051)	0.012 (0.021)	0.011 (0.021)
Hispanic	-0.008 (0.040)	-0.008 (0.040)	-0.022 (0.018)	-0.022 (0.018)
Other race	-0.065 (0.206)	-0.064 (0.207)	-0.108*** (0.024)	-0.112*** (0.025)
9 yrs of education	-0.023 (0.041)	-0.024 (0.041)	-0.003 (0.021)	-0.004 (0.021)
10 yrs of education	-0.014 (0.036)	-0.015 (0.036)	0.001 (0.018)	0.001 (0.018)
11 yrs of education	-0.038 (0.034)	-0.039 (0.034)	-0.008 (0.017)	-0.007 (0.017)
12 yrs of education	-0.089*** (0.033)	-0.088*** (0.033)	-0.021 (0.017)	-0.020 (0.017)
>12 yrs of education	-0.158*** (0.035)	-0.158*** (0.035)	-0.051*** (0.017)	-0.050*** (0.017)
Years of education missing	-0.067* (0.035)	-0.066* (0.035)	-0.008 (0.017)	-0.006 (0.017)

	(0.040)	(0.040)	(0.019)	(0.019)
Have Foster care spell	-0.011	-0.010	-0.006	-0.006
	(0.016)	(0.016)	(0.008)	(0.008)
Have cash assistance (AFDC/TANF) spell	0.034***	0.034***	-0.003	-0.004
	(0.011)	(0.011)	(0.006)	(0.006)
Have employment between 1995-2001	-0.050***	-0.050***	0.006	0.006
	(0.011)	(0.011)	(0.006)	(0.006)
property crime	0.013	0.014	0.007	0.008
	(0.019)	(0.019)	(0.009)	(0.009)
drug crime	0.020	0.021	0.007	0.008
	(0.017)	(0.017)	(0.008)	(0.008)
sex crime	-0.065**	-0.065**	0.006	0.007
	(0.028)	(0.028)	(0.013)	(0.013)
other crime	-0.034	-0.034	0.003	0.003
	(0.024)	(0.024)	(0.011)	(0.011)
missing crime	0.015	0.016	0.001	0.002
	(0.022)	(0.022)	(0.011)	(0.011)

---

N= 9,563; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Note: The omitted categories are white, no children, less than 9 years of education, and violent/person crime.

## References

Allensworth, E. and J. Q. Easton. 2001. "Calculating a Cohort Dropout Rate for the Chicago Public Schools: A Technical Research Report", Consortium on Chicago School Research.

Becker, G. 1981. *A Treatise on the Family*. Cambridge, M.A.: Harvard University Press.

Cho, R. M. *forthcoming*. "The Impact of Maternal Imprisonment on Children's Educational Achievement: Results from Children in Chicago Public Schools", *Journal of Human Resources*.

Currie, J. and N. Cole. 1993. "Welfare and Child Health: The Link Between AFDC Participation and Birth Weight", *The American Economic Review*, 83: 971-985.

Currie, J. and D. Thomas. 1995. "Does Head Start Make a Difference?", *The American Economic Review* 85: 341-364.

Dallaire, D. H. 2007a. "Children with Incarcerated Mothers: Developmental Outcomes, Special Challenges, and Recommendations". *Journal of Applied Developmental Psychology* 28:15-24.

Dallaire, D. H. 2007b. "Incarcerated Mothers and Fathers: A Comparison of Risks for Children and Families". *Family Relations* 56: 440-453.

Duncan, G. J., K. M. Ziol-Guest, and A. Kalil. 2008. "Early Childhood Poverty and Adult Attainment, Behavior and Health". Under review, *Child Development*.

Eccles, J. S. 1999. "The Development of Children Ages 6 to 14". *The Future of Children* 9: 30-44.

Erikson, E. H. 1968. *Identity, Youth, and Crisis*. New York: W.W. Norton and Company.

Foster, H. and J. Hagan. 2007. "Incarceration and Intergenerational Social Exclusion." *Social Problems* 54: 399-433.

Fritsch, T. A. and J. D. Burkhead. 1981. "Behavioral Reactions of Children to Parental Absence due to Imprisonment". *Family Relations* 30: 83-88.

Gaudin, J. M. Jr. and R. Sutphen. 1993. "Foster Care vs. Extended Family Care for Children of Incarcerated Mothers." *Journal of Offender Rehabilitation* 19:129-147.

Gillard, D. K. and A. J. Beck. 1996. "Prison and Jail Inmates, 1995." *Bureau of Justice Statistics Bulletin*, US Department of Justice, Washington, D.C. NCJ-161132.

Hagan, J. and R. Dinovitzer. 1999. "Collateral Consequences of Imprisonment for Children, Communities, and Prisoners." *Crime and Justice* 26: 121-162.

Hagen, K. A. and B. J. Myers. 2003. "The Effect of Secrecy and Social Support on Behavioral Problems in Children of Incarcerated Women". *Journal of Child and Family Studies* 12: 229-242.

Hanlon, T. E., R. J. Blatchley, T. Bennett-Sears, K. E. O'Grady, M. Rose, and J. M. Callaman. 2005. "Vulnerability of Children of Incarcerated Addict Mothers: Implications for Preventive Interventions". *Children and Youth Services Review* 27: 67-84.

Hanlon, T. E., S. B. Carswell, and M. Rose. 2007. "Research on the Caretaking of Children of Incarcerated Parents: Findings and Their Service Delivery Implications". *Children and Youth Services Review* 29: 348-362.

Harrison and Beck. 2005. "Prison and Jail Inmates at Midyear 2004." *Bureau of Justice Statistics*, US Department of Justice, Washington, D.C. NCJ 213133.

Johnson, E. and J. Waldfogel. 2004. "Children of Incarcerated Parents: Multiple Risks and Children's Living Arrangements." Pp. 97-131 in *Imprisoning America: The Social Effects of Mass Incarceration*, edited by Mary Patillo, David Weiman, and Bruce Western. New York: Russell Sage Foundation.

Johnson, T., Selber, K., and Lauderdale, M. 1998. "Developing Quality Services for Offenders and Families: An Innovative Partnership." *Child Welfare* 77: 595-615.

Johnston, D. 1991. *Jailed mothers*. Pasadena, CA: Pacific Oaks Center for Children of Incarcerated Parents.

Johnston, D. 1995. "Effects of Parental Incarceration." In *Children of Incarcerated Parents*, ed. Katherine Gabel, and Denise Johnston, 59-88. Lexington Books.

Ku, I. and R. Plotnick. 2003. "Do Children from Welfare Families Obtain Less Education?" *Demography* 40: 151-170.

Mead, L. 1997. "The Rise of Paternalism." Pp. 1-38 in *The New Paternalism: Supervisory Approaches to Poverty*, edited by L. Mead. Washington, DC: Brookings Institution Press.

Mumola, C. J. 2000. "Incarcerated Parents and Their Children." *Bureau of Justice Statistics Special Report*, U.S. Department of Justice. Washington, D.C. NCJ 182335.

Murray, J. and D. P. Farrington. 2005. "Parental Imprisonment: Effect on Boys' Antisocial Behaviour and Delinquency through the Life-course." *Journal of Child Psychology and Psychiatry* 46:1269-1278.

Myers, B. J., T. M. Smarsh, K. Amlund-Hagen, and S. Kennon. 1999. "Children of Incarcerated Mothers." *Journal of Child and Family Studies* 8: 11-25.

Poehlmann, J. 2005a. "Representations of Attachment Relationships in Children of Incarcerated Mothers". *Child Development* 76: 679-696.

Poehlmann, J. 2005b. "Children's Family Environments and Intellectual Outcomes During Maternal Incarceration". *Journal of Marriage and Family* 67:1275-1285.

Sabol, W., T. Minton, and P. Harrison. 2007. "Prison and Jail Inmates at Midyear 2006." *Bureau of Justice Statistics Bulletin*, U.S. Department of Justice. Washington, D.C. NCJ 217675.

Swann, Christopher, and Michelle Sheran Sylvester. 2006. "The Foster Care Crisis: What Caused Caseloads to Grow?" *Demography* 43:309-335.

Wildeman, C. 2007. "Parental Imprisonment, the Prison Boom, and the Concentration of Childhood Disadvantage". *Unpublished manuscript available at:*  
<http://paa2007.princeton.edu/download.aspx?submissionId=7180>

**Table 1. Descriptive Statistics of the Sample Children**

	(1) All Children	(2) Children with Siblings
Characteristics of Children		
Age at mother's first incarceration <sup>a</sup>	12.4 (2.8)	12.3 (2.7)
% female	48.6	48.4
% white	4.2	3.5
% black	88.1	88.6
% Hispanic	4.4	4.1
% other	3.3	3.8
Child Outcomes		
% dropping out of high school	50.1	53.1
% entering correctional institution	7.8	9.2
Final grade at dropout <sup>b</sup>	9.7	9.7
Characteristics of Mother		
Age at first incarceration <sup>a</sup>	33.5 (5.5)	33.4 (4.8)
Age at child's birth	21.1 (5.0)	21.1 (4.6)
# of kids	3.5 (2.0)	3.9 (2.0)
% white	6.2	5.0
% black	88.5	89.4
% Hispanic	5.3	5.5
% other	0	0
% < 9 yrs of educ	3.2	3.3
% 9 yrs of educ	4.5	5.1
% 10 yrs of educ	10.6	11.0
% 11 yrs of educ	27.5	30.2

% 12 yrs of educ	35.1	34.3
% > 12 yrs of educ	12.7	10.0
% missing yrs of educ	6.4	6.1
% have foster care spell	13.7	11.5
% receive cash assistance	56.0	56.0
% ever employed during 1995-2001 <sup>c</sup>	62.2	61.0

#### Characteristics of Maternal Incarceration

% entering jail once	46.4	45.4
% entering jail multiple times & no prison	32.1	31.8
% entering prison	21.5	22.8
% violent/person crime	14.4	14.9
% property crime	21.0	20.6
% drug crime	39.8	39.8
% sex crime	5.5	5.2
% other crime <sup>d</sup>	8.0	7.7
% missing crime	11.2	11.8
Total # of days Incarcerated <sup>e</sup>	150.0 (326.3)	161.3 (341.4)
25 <sup>th</sup> %tile	2	2
50 <sup>th</sup> %tile	16	16
75 <sup>th</sup> %tile	121	141
Total # of Incarceration spells <sup>e</sup>	2.2 (2.1)	2.2 (2.0)
# of prison Incarceration spells <sup>e</sup>	0.3 (0.6)	0.3 (0.6)
N of children	9,563	2,972
N of mothers	6,591	2,177

Note: Information relating to the timing or characteristics of incarceration is computed for the first observed maternal incarceration during the sampling period (January 1, 1993 – June 30, 2001). Specifically, information on the first observed jail spell is collected for those who only have jail incarceration(s), while information on the first observed prison spell is collected for those who have prison spell(s). Information on contact with social and child welfare services are computed based on records between January 1, 1991 and June 30, 2001. Standard deviations are in parentheses.

<sup>a</sup> Both the child's and mother's age is calculated for the first observed maternal incarceration between January 1, 1993 and June 30, 2001.

<sup>b</sup> The average grade at dropout is calculated only for dropouts.

<sup>c</sup> Information on employment comes from the state Unemployment Insurance (UI) wage records during the periods between January 1, 1995 and June 30, 2001.

<sup>d</sup> Other crime consists of parole or bond violation, driving violation, and fugitive warrant.

<sup>e</sup> Estimate includes information on the dosage of maternal incarceration when children are between the ages of 5 and 17.

**Table 2. Effect of Maternal Incarceration on High School Dropout Rate and Admission to Correctional Institution: Cross Sectional Estimates**

Outcome	High School Dropout		Admission to Correctional Institution	
	(1) Model 1	(2) Model 2	(3) Model 1	(4) Model 2
Timing Effect:				
Exposure to Maternal Incarceration at				
Ages 5 to 10	-0.063*** (0.018)	-0.075*** (0.016)	-0.026*** (0.009)	-0.036*** (0.009)
Ages 11 to 14	0.014 (0.017)	0.020 (0.015)	0.012 (0.009)	0.015* (0.008)
Ages 15 to 17	0.090*** (0.019)	0.096*** (0.015)	0.027** (0.012)	0.048*** (0.008)
Dosage Effect:				
Number of days Incarcerated		0.000 (0.00)		0.000** (0.00)
Ages 5 to 10	0.000 (0.00)		0.000 (0.00)	
Ages 11 to 14	0.000 (0.00)		0.000** (0.00)	
Ages 15 to 17	0.000 (0.00)		0.000 (0.00)	
Number of Incarcerations		-0.003 (0.004)		-0.001 (0.002)
Ages 5 to 10	-0.010 (0.007)		-0.006** (0.002)	
Ages 11 to 14	-0.002 (0.006)		-0.002 (0.003)	
Ages 15 to 17	0.004 (0.010)		0.011* (0.006)	
Number of Prison Incarcerations		-0.015 (0.012)		-0.001 (0.006)
Ages 5 to 10	-0.032 (0.025)		-0.010 (0.010)	
Ages 11 to 14	0.001 (0.017)		0.000 (0.008)	
Ages 15 to 17	-0.030 (0.025)		0.008 (0.015)	

N= 9,563; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 3. Effect of Maternal Incarceration on High School Dropout Rate and Admission to Correctional Institution: Sibling Pair Sample**

Outcome	High School Dropout		Admission to Correctional Institution	
	(1) Model 1	(2) Model 2	(3) Model 1	(4) Model 2
Timing Effect:				
Exposure to Maternal Incarceration at				
Ages 5 to 10	-0.074** (0.034)	-0.079*** (0.027)	-0.020 (0.022)	-0.035* (0.020)
Ages 11 to 14	0.007 (0.028)	0.020 (0.027)	0.004 (0.020)	0.011 (0.018)
Ages 15 to 17	0.096*** (0.034)	0.063** (0.027)	0.016 (0.022)	0.036** (0.018)
Dosage Effect:				
Number of days Incarcerated				
		0.000 (0.00)		0.000 (0.00)
Ages 5 to 10	0.000 (0.00)		0.000 (0.00)	
Ages 11 to 14	0.000 (0.00)		0.000 (0.00)	
Ages 15 to 17	0.000 (0.00)		0.000 (0.00)	
Number of Incarcerations				
		-0.033*** (0.013)		-0.008 (0.010)
Ages 5 to 10	-0.037* (0.021)		-0.016 (0.012)	
Ages 11 to 14	-0.024* (0.014)		-0.007 (0.011)	
Ages 15 to 17	-0.047** (0.019)		0.003 (0.014)	
Number of Prison Incarcerations				
		0.069 (0.049)		0.027 (0.035)
Ages 5 to 10	0.036 (0.071)		-0.003 (0.050)	
Ages 11 to 14	0.051 (0.057)		0.026 (0.036)	
Ages 15 to 17	0.076 (0.055)		0.051 (0.041)	

N= 4,009; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 4. Effect of Maternal Incarceration on High School Dropout Rate and Admission to Correctional Institution by Gender: Sibling Pair Sample**

Outcome	High School Dropout Admission to Correctional Institution			
	<i>Sons</i>	<i>Daughters</i>	<i>Sons</i>	<i>Daughters</i>
Timing Effect:				
Exposure to Maternal Incarceration at				
Ages 5 to 10	-0.090** (0.045)	-0.075 (0.046)	-0.032 (0.034)	-0.009 (0.024)
Ages 11 to 14	0.012 (0.037)	0.003 (0.039)	0.010 (0.032)	-0.003 (0.022)
Ages 15 to 17	0.095** (0.043)	0.096* (0.051)	0.047 (0.034)	-0.024 (0.026)
Dosage Effect:				
Number of days Incarcerated				
Ages 5 to 10	0.000 (0.00)	0.000 (0.00)	0.000 (0.00)	0.000 (0.00)
Ages 11 to 14	0.000 (0.00)	0.000 (0.00)	0.000 (0.00)	0.000 (0.00)
Ages 15 to 17	0.000 (0.00)	0.000 (0.00)	0.000 (0.00)	0.000 (0.00)
Number of Incarcerations				
Ages 5 to 10	0.009 (0.024)	-0.093*** (0.029)	-0.002 (0.018)	-0.034** (0.014)
Ages 11 to 14	-0.016 (0.016)	-0.040* (0.021)	0.006 (0.019)	-0.023** (0.011)
Ages 15 to 17	-0.015 (0.020)	-0.093*** (0.030)	0.012 (0.022)	-0.003 (0.015)
Number of Prison Incarcerations				
Ages 5 to 10	-0.034 (0.091)	0.192* (0.100)	-0.060 (0.078)	0.068 (0.047)
Ages 11 to 14	0.018 (0.070)	0.132 (0.082)	-0.012 (0.059)	0.069* (0.039)
Ages 15 to 17	0.019 (0.068)	0.180** (0.079)	0.013 (0.067)	0.075* (0.044)
N	2,010	1,821	2,010	1,821

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1