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Detrimental for Some? Heterogeneous Effects of Maternal Incarceration on Child Wellbeing

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Abstract

Research Summary—*We use data from the Fragile Families and Child Wellbeing Study (N = 3,197) to consider the heterogeneous effects of maternal incarceration on 9-year-old children. We find that maternal incarceration has no average effects on child well-being (measured by caregiver-reported internalizing problem behaviors, caregiver-reported externalizing problem behaviors, Peabody Picture Vocabulary Test-Third Edition scores, and child-reported early juvenile delinquency) but that the effects vary by mothers' propensities for experiencing incarceration. Maternal incarceration is deleterious for children of mothers least likely to experience incarceration but mostly inconsequential for children of mothers more likely to experience incarceration.*

Policy Implications—It is important that public policies take into account the fact that not all children experience similar effects of maternal incarceration. For children of mothers who are unlikely to experience incarceration, the negative consequences of maternal incarceration could be driven by at least three factors, all of which may be operating simultaneously and all of which potentially call for different policy interventions: (a) jail incarceration as opposed to prison incarceration, (b) incarceration for a crime that did minimal—or no—harm to their children, and (c) inadequate family supports for coping with maternal incarceration. We discuss these policy implications.

Keywords

maternal incarceration; parental incarceration; child well-being; heterogeneous treatment effect models; public policy

In response to dramatic, highly concentrated increases in the American incarceration rate throughout the last four decades (e.g., Bonczar, 2003; Sampson and Loeffler, 2010; Western, 2006), scholars have developed an acute interest in the growing, yet recently stabilized, population of children who experience parental incarceration (Wildeman, 2009). Most of this research has explored the intergenerational consequences of *paternal* incarceration (e.g., Foster and Hagan, 2007; Geller, Cooper, Garfinkel, Schwartz-Soicher, and Mincy, 2012;

Hagan and Foster, 2012a; Murray and Farrington, 2005, 2008; Roettger and Boardman, 2012; Roettger and Swisher, 2011; Wakefield and Wildeman, 2011, 2013; Wildeman, 2010), which is unsurprising given that children have a much higher cumulative risk of experiencing paternal, rather than maternal, incarceration (Wildeman, 2009).

But recent decades have witnessed striking relative increases in *maternal* incarceration, especially among poor and minority children (Wildeman, 2009), and accordingly, a burgeoning literature has considered the intergenerational consequences of maternal incarceration (for reviews, see Arditti, 2012a, 2012b; Eddy and Poehlmann, 2010). Quantitative research in this area often has estimated the average effects of maternal incarceration on indicators of child well-being including internalizing and externalizing problem behaviors, test scores, and delinquency (e.g., Cho, 2009; Dallaire, Zeman, and Thrash, 2014; Foster and Hagan, 2013; Hagan and Foster, 2012b; Poehlmann, 2005; Wildeman and Turney, 2014). Some of this research has found that maternal incarceration, on average, is detrimental to children (Hagan and Foster, 2012b), whereas other research has suggested it is inconsequential (Wildeman and Turney, 2014) or dependent on the outcome (Foster and Hagan, 2013; Lee, Fang, and Luo, 2013; Murray, Farrington, and Sekol, 2012). The variation in the effects of maternal incarceration is strikingly apparent in the rich and textured qualitative literature (Arditti, 2012a; Giordano, 2010; Siegel, 2011; Turanovic, Rodriguez, and Pratt, 2012).

Despite compelling indications of heterogeneous effects within qualitative research studies, as well as inconsistency in the direction, magnitude, and statistical significance of findings across quantitative research studies, no broadly representative quantitative research has provided a systematic examination of the heterogeneous effects of maternal incarceration on children's problem behaviors, test scores, or delinquency. Therefore, in this article, we use data from the Fragile Families and Child Wellbeing Study (FFCWB), a birth cohort of children born to mostly unmarried parents in urban areas, and a series of propensity score matching techniques to consider whether the effects of maternal incarceration vary by the social contexts that shape children's likelihoods of experiencing maternal incarceration. Specifically, we consider heterogeneity in the effects of maternal incarceration according to maternal propensities to experience incarceration across four indicators of well-being in middle childhood: caregiver-reported internalizing problem behaviors, caregiver-reported externalizing problem behaviors, Peabody Picture Vocabulary Test-Third Edition (PPVT-III) scores, and child-reported early juvenile delinquency. Although these data have been used extensively to consider the effects of paternal incarceration on children, few researchers have considered the effects of *maternal* incarceration (see Geller, Garfinkel, Cooper, and Mincy, 2009; Wildeman and Turney, 2014), and no studies using these data have considered variation in the relationship between maternal incarceration and children's well-being by the propensity for experiencing maternal incarceration. This lack of research is a missed opportunity on the research side as these data include established measures of well-being in middle childhood, contain a large number of children exposed to maternal incarceration, and include incarcerated mothers who are demographically similar to mothers incarcerated in jails, state prisons, and federal prisons (Wildeman and Turney, 2014). It also represents a missed opportunity on the policy side, as identifying effect heterogeneity in the consequences of maternal incarceration also could provide guidance about which types of

maternal incarceration policies might harm children, benefit children, or be inconsequential for children.

The results suggest that the effects of maternal incarceration on well-being in middle childhood are strikingly heterogeneous. For three of the four measures considered (caregiver-reported internalizing problem behaviors, caregiver-reported externalizing problem behaviors, and child-reported early juvenile delinquency), maternal incarceration is damaging for children of mothers unlikely to experience incarceration. The effects of maternal incarceration, for these children, are pronounced, corresponding to between two fifths and three fifths of a standard deviation difference from their counterparts without incarcerated mothers. But maternal incarceration exerts no independent effect on children of mothers more likely to experience incarceration. By providing the first broadly representative quantitative evidence documenting heterogeneous effects of maternal incarceration on children, this study helps rectify divergent findings about the average effects of maternal incarceration (e.g., Foster and Hagan, 2013; Hagan and Foster, 2012b; Huebner and Gustafson, 2007; Wildeman and Turney, 2014), advances our understanding about how the consequences of incarceration may vary across social contexts, and provides novel insights for policy makers.

Understanding Heterogeneity in the Effects of Maternal Incarceration

The inattention of prior quantitative research to systematically documenting the heterogeneous effects of maternal incarceration on child well-being is an unfortunate oversight for at least three reasons. First, qualitative research has suggested that the effects of maternal incarceration are not identical (or even similar) for all children. Second, quantitative research, which has relied on samples that are varied in the proportion of children who experience maternal incarceration (as well as in the rigor of statistical methods employed and the extensiveness of controls included), has come to conflicting conclusions regarding the average effects of maternal incarceration. Third, many critical of research on the intergenerational consequences of parental incarceration have maintained that negative effects of parental incarceration are, at best, implausible for the most destructive parents (e.g., Giordano, 2010; Johnston, 2006; Sampson, 2011).

We discuss these three points in the following discussion.

Heterogeneity in Qualitative Research

First, and most importantly, it is important to document systematically the heterogeneous effects of maternal incarceration on children because qualitative research consistently has suggested considerable variability in effects (Arditti, 2012a; Siegel, 2011; Turanovic et al., 2012). For example, several in-depth qualitative examinations have provided evidence that maternal incarceration—through some combination of parental absence, emotional trauma, caregiver instability, or stigma—is harmful to children (Arditti, 2012a; Siegel, 2011; Turanovic et al., 2012). Jane Siegel's interviews with children of imprisoned mothers provided two especially compelling examples of the psychological toll that maternal incarceration can take on children:

I miss her so much. I just want her to be home already. It's really bad 'cause when things happen, I want to tell her about it and I really can't because she's not here and I really want her to really be here. I wanted her to be here for my fifteenth birthday. I want her to be here when I graduate. I want her to be here for my prom. I want her to be here for so many things, but she might not be here and I hate that. I want her to be here so bad. I love my mother. She is a very good mother. She's awesome. (Valencia, in Siegel, 2011: 138)

Most people's fathers be in since they was babies, for killing somebody or doing this or selling drugs. So it's not a big deal. So when your mother be in prison ... it's even worse, period, than a father. Because most of the time a father don't never take part in the kid's life anyway. (Naja, in Siegel, 2011: 149).

Yet, and contradictory to evidence suggesting deleterious consequences of maternal incarceration, qualitative research has found that maternal incarceration is a constructive experience for some children and, more broadly, for family functioning. This possibility was convincingly present in two qualitative studies (Siegel, 2011; Turanovic et al., 2012). For example, Turanovic and colleagues (2012) found that, on balance, maternal incarceration is a positive experience for more than one fourth of children's caregivers. Maybe the most poignant example of the beneficial effects of maternal incarceration comes from Eddy, a father of three:

You know what happens to a father when a mother goes to jail? In my case, it's the best thing that ever happened to me and my kids. Best thing that ever happened for us if you ask me. She didn't like the split between us so she would pop my tires, break my windows, so I went to the courts a couple of times and this time they just really put their foot down and she was sent to state, sentenced a year and a half. She cost me thousands of dollars, popping my tires and just chaos. We were hotel hopping. We didn't have a choice. I had to move three times because of Erica coming to my house being loud. One apartment complex put me out because she was yelling outside of my door, and I had a restraining order but they said it didn't matter, it was some kind of policed apartment complex, any problems and you're out of there. (Turanovic et al., 2012: 938–939)

In addition to providing evidence of positive and negative effects, some qualitative research has indicated that maternal incarceration is simply inconsequential for children. Maternal incarceration could be inconsequential for several reasons. First, some mothers are entirely absent from children's lives prior to incarceration, and in these cases, absence via incarceration likely has no direct effect (e.g., Turanovic et al., 2012: 935). Additionally, incarcerated mothers are an extremely disadvantaged group—they disproportionately report trauma, substance abuse, housing instability, and mental illness—and it could be these disadvantages, and not maternal incarceration itself, that explain any differences between these children and their counterparts (e.g., Giordano, 2010). In other words, these children would likely experience disadvantages regardless of maternal incarceration (e.g., Siegel, 2011; Turanovic et al., 2012). Finally, it is possible that the positive and negative effects of maternal incarceration roughly cancel each other out and, accordingly, lead to average null effects on children (e.g., Giordano, 2010: 147–150; also see Turney, 2014a).

Heterogeneity in Quantitative Research

A second reason to consider the heterogeneous effects of maternal incarceration on child well-being is that quantitative research, even when only considering the studies that have used broadly representative data, has documented incredibly disparate average effects.¹ Consider three examples that used large, population-based samples: Hagan and Foster's (2012b; also see Foster and Hagan, 2013) analysis of the National Longitudinal Study of Adolescent Health (Add Health); Huebner and Gustafson's (2007) analysis of children born to members of the National Longitudinal Study of Youth 1979 (NLSY79); and Wildeman and Turney's (2014) analysis of the FFCWB. Across these three studies, the proportion of children who experienced maternal incarceration—and, correspondingly, the level of selection into maternal incarceration—was dramatically different. Approximately 1% of children in the Add Health study experienced maternal incarceration any time between birth and 18 years of age (Hagan and Foster, 2012b: 48), approximately 2% of children in the NLSY79 study experienced maternal incarceration between birth and 18–24 years of age (Huebner and Gustafson, 2007: 286), and approximately 9% of children in the FFCWB study experienced maternal incarceration between birth and 9 years of age (Wildeman and Turney, 2014).

The dramatic differences between the two studies that used the Add Health and NLSY79 (Hagan and Foster, 2012b; Huebner and Gustafson, 2007) and the one study that used the FFCWB (Wildeman and Turney, 2014) could have resulted from differential selection into incarceration across the samples. The FFCWB study included a population-based sample of children born to mostly unmarried (and, therefore, mostly disadvantaged) mothers around the turn of the millennium. Because of their disadvantage and because of the relatively high incarceration rates, compared with rates in even slightly earlier historical periods, maternal incarceration is a more normative experience among these children than among children in the other two samples. Incarcerated mothers in this study, compared with those in the other two studies, are more similar to mothers who are not incarcerated. This differential selection could explain why two of the three studies found large and statistically significant negative average effects of maternal incarceration (Hagan and Foster, 2012b; Huebner and Gustafson, 2007) and one study found statistically nonsignificant average effects (Wildeman and Turney, 2014). Under significant heterogeneity by the propensity for incarceration, which these studies did not consider, such marked variations in the probability of experiencing maternal incarceration could easily lead to the divergent average effects across these studies (although, for research on racial and ethnic differences in the effects of maternal incarceration on caregiver-reported behavioral problems, see Wildeman and Turney, 2014). It could be that children drawn from samples in which maternal incarceration is highly unlikely experience deleterious consequences, and children drawn from samples where maternal incarceration is more common experience beneficial or null consequences. Yet, because no broadly representative quantitative research has considered both the average effects of maternal incarceration and the effects by the propensity for experiencing maternal incarceration, it is impossible to explain these divergent findings.²

¹However, some research has suggested that individual-level characteristics of the mother can moderate the link between maternal incarceration and child well-being (e.g., Hanlon, Blatchley, et al., 2005; Hanlon, O'Grady, Bennett-Sears, and Callaman, 2005; Poehlmann, 2005; Poehlmann, Schlafer, Maes, and Hanneman, 2008).

Critiques of Research on Consequences of Incarceration

A final—and different—reason why it is important to document the heterogeneous effects of maternal incarceration relates to research on the consequences of incarceration more broadly, especially as it relates to family life. Two ideas have been dominant among scholars most critical of this research (e.g., Giordano, 2010; Johnston, 2006; Sampson, 2011). The first idea is that selection into incarceration—via earlier criminal justice contact, mental illness, or substance abuse—rather than incarceration itself drives the negative effects of parental incarceration on child well-being. The second, and related, idea is that some incarcerated parents engage in behaviors so damaging to family life that, accordingly, their absence may actually be beneficial for their children.

The second concern is directly relevant to the mothers with a high probability of experiencing incarceration.

A myopic focus on the average effects of maternal incarceration makes it, to a degree, impossible for scholars—especially those who know that characteristics such as emotional instability, severe substance abuse, or child neglect are detrimental to children—to find research that has shown negative effects of maternal incarceration credible (absent also having shown that maternal incarceration does not help—or at least does not harm—the children of mothers most likely to be incarcerated). Considering effect heterogeneity—by mothers' propensity for experiencing incarceration—thus has the potential to provide a “reality check” on the prevailing literature considering the average effects of maternal incarceration. Several examinations of the effects of paternal incarceration successfully considered variation in effects—although not in the propensity score matching framework—and they found that the detrimental effects of paternal incarceration are muted when the father was nonresident prior to his incarceration (Geller et al., 2012) and virtually nonexistent when the father had engaged in domestic violence (Wildeman, 2010).

Current Study

In this study, we use data from the FFCWB to examine how the effect of maternal incarceration varies across mothers' propensities for experiencing incarceration. This propensity score matching approach—which matches incarcerated mothers with mothers who are similar across a distribution of covariates except for their incarceration experience—allows us to consider an array of social contexts that shape children's lives prior to incarceration. This approach also is especially valuable given the vast differences between incarcerated and not incarcerated mothers. We proceed under the ignorability assumption, which is the assumption that there are no unobserved confounders (Morgan and Harding, 2006), but our analyses also investigate the extent to which unobserved selection into incarceration exists and, hence, provide insight into the degree to which the results could violate this assumption and find statistically significant effects.

²Of course, variation across samples in the probability of experiencing maternal incarceration is not the only potential explanation for divergent findings across studies. Other features—sampling strategies, modeling strategies, control variables, ages of children, and outcomes—also could explain these divergent findings.

Our examination of the relationship between maternal incarceration and child well-being has at least three key strengths. First, we provide insight into the heterogeneous effects of maternal incarceration by using data and methods that allow us to adjust extensively for selection into incarceration. In so doing, we contribute to research on the consequences of incarceration for families (e.g., Comfort, 2008; Turney, 2014b; Turney, Schnittker, and Wildeman, 2012; Turney and Wildeman, 2013) and to research on heterogeneous treatment effects (e.g., Brand and Xie, 2010). Second, by considering a range of outcomes in middle childhood that are linked to later life-course outcomes, we provide broad insight into how maternal incarceration will affect children throughout their life course (Caspi, Bem, and Elder, 1989; Knoester, 2003; Loeber, Farrington, and Petechuk, 2013; McLeod and Kaiser, 2004). Finally, by adding nuance to research on the consequences of imprisonment by looking for both statistically significant and nonsignificant effects, we contribute to a shift in this research program (e.g., Turney and Wildeman, 2013).

Method

Data

We use longitudinal data from the FFCWB, a birth cohort study of 4,898 children born between 1998 and 2000 (Reichman, Teitler, Garfinkel, and McLanahan, 2001). Baseline in-person interviews with both mothers and fathers occurred nearly immediately after the focal child's birth. Parents were interviewed by telephone when their children were approximately 1, 3, 5, and 9 years old, and at the latter three waves, some families also participated in an in-home interview. Baseline response rates were 86% for mothers and 78% for fathers. Of those who participated in the baseline interview, 91%, 89%, 88%, and 76% of children had at least one parent (and often both parents) participate in the 1-, 3-, 5-, and 9-year telephone interviews, respectively. Approximately 69% of children had a caregiver (most often a mother) complete the 9-year in-home interview.

In constructing the analytic sample, we dropped the 1,507 observations without a complete 9-year in-home interview, as the dependent variables are measured during this interview, and the additional 194 observations missing data on any of the four dependent variables. The analytic sample, then, includes 3,197 observations.³ Because families with a complete 9-year in-home interview are likely different from those without a complete 9-year in-home interview, and this attrition might have implications for the results, we compare the baseline sample and the analytic sample in Table A1. This table shows there are some statistically significant, although small, observed differences between the baseline and analytic samples. Mothers in the analytic sample, compared with mothers in the baseline sample, are more likely to be non-Hispanic Black, less likely to be foreign-born, and are more likely to have younger mothers. In the analytic sample, mothers are more likely to be employed and fathers are less likely to be employed. Fathers have higher impulsivity and are more likely to have been previously incarcerated. We return to the implications of these differences in the discussion.

³This analytic sample includes two children who had a mother incarcerated at the 9-year survey. We include these children in the analytic sample because they have valid outcomes on the dependent variables.

We do not impute the dependent variable but preserve missing covariate data with multiple imputation (Allison, 2001). Prior to imputation, nearly all covariates are missing fewer than 10% of observations in the analytic sample. Exceptions include mother's parenting stress, father's employment, and father's impulsivity, which are missing 17%, 26%, and 35% of observations, respectively.

Measures

Outcome variables.—We examine four indicators of child well-being: caregiver-reported internalizing problem behaviors, caregiver-reported externalizing problem behaviors, PPVT-III scores, and child-reported early juvenile delinquency. To begin with, during the in-home 9-year interview, children's caregivers (mothers, in 93% of cases in the analytic sample) were asked to respond to a series of questions from the Child Behavior Checklist, a commonly used measure of children's behavior (Achenbach, 1992). Caregivers were asked to report how often their children engaged in an array of behaviors (0 = not true, 1 = somewhat or sometimes true, and 2 = very true or often true). Internalizing problem behaviors are measured by an average of responses to 32 questions ($\alpha = .88$), and externalizing problem behaviors are measured by an average of responses to 34 questions ($\alpha = .91$). Additionally, the PPVT-III, administered during the in-home 9-year interview, measures children's age-standardized verbal ability. Interviewers read words to children, who had to identify a picture (among a set of four pictures) corresponding to the word (Dunn and Dunn, 1997). Finally, early juvenile delinquency is measured by children's self-reports about participating in 17 delinquent activities from the "Things that You Have Done" scale (Maumary-Gremaud, 2000; also see Elliott, Huizinga, and Menard, 1989). The measure of delinquency is a sum of these items (Thornberry and Krohn, 2002).⁴ For consistency across outcomes and ease of interpretation, we standardize all four dependent variables (mean = 0 and standard deviation = 1).⁵

Explanatory variable.—A dummy variable indicates maternal incarceration between the 1- and 9-year interviews. Mothers are considered to experience incarceration if the interviews provide direct or indirect evidence of incarceration. Direct evidence means that either the mother or father reports, at the 3-, 5-, or 9-year interviews, that the mother is currently incarcerated or has been incarcerated since the previous interview. Indirect evidence means that information about maternal incarceration emerged at other points during the mother's, father's, or caregiver's interviews (e.g., a report that the child stopped living with the mother because she was incarcerated), instead of in response to a direct question. Indirect evidence of maternal incarceration also is ascertained when the mother

⁴Children were asked to report whether they had ever done the following 17 activities: (a) purposely damaged or destroyed property that was not yours; (b) taken or stolen something that did not belong to you from another person or from a store; (c) taken some money at home that did not belong to you, like from your mother's purse or from your parents' dresser; (d) cheated on a school test; (e) had a fist fight with another person; (f) hurt an animal on purpose; (g) gone into somebody's garden, backyard, house, or garage when you were not supposed to be there; (h) run away from home; (i) skipped school without an excuse; (j) secretly taken a sip of wine, beer, or liquor; (k) smoked marijuana, grass pot, or weed; (l) smoked a cigarette or used tobacco; (m) been suspended or expelled from school; (n) written things or sprayed paint on walls or sidewalks or cars; (o) purposely set fire to a building, a car, or other property or tried to do so; (p) avoided paying for things such as movies, bus or subway rides, or food; or (q) thrown rocks or bottles at people or cars. Note that some of these activities might be prosocial and others may lead to future deviant behavior (e.g., Foster, Nagin, Hagan, Angold, and Costello, 2010).

⁵The dependent variables have low (e.g., r for internalizing problem behaviors and PPVT-III scores = -0.08) to high correlations (e.g., r for internalizing and externalizing problem behaviors = 0.66)

and father reports, at the 1-year survey, that the mother was never incarcerated and that the mother or father subsequently reports she was *ever* incarcerated. Therefore, both direct and indirect evidence of incarceration indicates the mother was incarcerated in the child's lifetime. Approximately 9% of mothers experienced incarceration.

Control variables.—We use mother, father, and child characteristics, including a host of characteristics associated with selection into incarceration, to generate propensity scores for maternal incarceration. Importantly, to ensure temporal ordering between the control variables and maternal incarceration, we measure all control variables at the baseline or 1-year survey and, thus, prior to maternal incarceration. The one exception includes maternal impulsivity, as we will describe next, which was only ascertained at the 5-year interview but is considered a stable, time-invariant characteristic (Gottfredson and Hirschi, 1990).

Demographic characteristics include dummy variables that indicate mother's and father's race (non-Hispanic White, non-Hispanic Black, Hispanic, non-Hispanic other race), mother's immigrant status, mother's age, and mother's family structure at 15 years of age (1 = lived with both biological parents and 0 = did not live with both biological parents). Socioeconomic factors include mother's and father's educational attainment (less than high school, high-school diploma or GED, postsecondary education), a dummy variable indicating the mother's household income is below the poverty line, a continuous measure of material hardship (e.g., received free food or meals in the past year and evicted from home or apartment for not paying the rent or mortgage), and dummy variables indicating the mother and father were employed in the last week. Family characteristics include a dummy variable indicating whether a grandmother lives in the child's household, the parents' relationship status (married, cohabiting, nonresidential romantic relationship, or separated), a continuous variable indicating mother-reported relationship quality with the father (1 = poor to 5 = excellent), and a continuous variable indicating the number of children in the mother's household. The analyses also control for mother's major depression (measured with the Composite International Diagnostic Instrument-Short Form; Kessler, Andrews, Mroczek, Ustun, and Wittchen, 1998) and mother's parenting stress (e.g., I feel trapped by my responsibilities as a parent or taking care of my child is much more work than pleasure; $\alpha = .60$). Three child characteristics include gender, low birth weight, and a continuous measure of children's temperament, with higher scores indicating greater emotionality and shyness ($\alpha = .52$; Buss and Plomin, 1984).

Finally, in generating the propensity score, we control for a host of mother's and father's characteristics that could confound the relationship between maternal incarceration and child well-being. Dummy variables indicate the mother smoked during pregnancy and the mother used drugs or drank alcohol during pregnancy, both of which might be related to adverse birth outcomes. Dummy variables indicate the following: The mother has a substance abuse problem (measured by an affirmative response to at least one of the following at the 1-year interview: since the child was born, drinking or using drugs interfered with day-to-day management; since the child was born, drinking or use drugs interfered with personal relationships; and sought help or been treated for drug or alcohol problems since the child was born); the father has a substance abuse problem (measured similarly as mother's substance abuse problem but includes both mother's and father's reports of the

father's substance abuse problem at the baseline and 1-year interviews); the father engaged in domestic violence; the mother was previously incarcerated (between the baseline and 1-year interviews); and the father was previously incarcerated (at or prior to the 1-year interview, including before baseline). Mother's and father's impulsivity were measured with a continuous variable measured by questions such as "I will often say whatever comes into my head without thinking" and "often I don't think enough before I act" ($\alpha = .86$ for mothers and $.84$ for fathers; Dickman, 1990). Descriptive statistics are presented in Table 1.

Analytic Strategy

The first analytic stage estimates the average effects of maternal incarceration on child well-being. Although prior research has considered the average effects of maternal incarceration using these data (e.g., Geller et al., 2009; Wildeman and Turney, 2014), we present these estimates to (a) show that our approach (which is similar, but not identical, to previous research) provides results consistent with previous research and (b) provide context for interpreting the results demonstrating heterogeneous effects. To estimate the average effects, we first estimate a logistic regression model to generate a propensity score for each observation in each of the 20 imputed data sets. The propensity score, which is essentially a risk factor for experiencing the treatment, maternal incarceration, ranges from 0 to 1. We use all control variables, which prior research has shown to be associated with either incarceration or child well-being, to generate the propensity score. Next, we ensure that covariates in the treatment and control groups are statistically indistinguishable from one another. The two groups differ only in their experience of the treatment. We then use kernel matching, which matches all treatment observations to control observations by weighting control observations by their distance from treatment cases (kernel = Epanechnikov; bandwidth = 0.06). Ordinary least-squares (OLS) models then estimate internalizing problem behaviors, externalizing problem behaviors, PPVT-III scores, and early juvenile delinquency on matched samples. We average the results across the 20 imputed data sets (Allison, 2001; Rubin, 1987).

The second analytic stage, and the key part of our analytic strategy, estimates the heterogeneous effects of maternal incarceration on child well-being. We use multilevel propensity score models to explore the possibility that some children are more vulnerable to the effects of maternal incarceration than other children. First, we group observations into three stratum based on their propensity score $\{p = [.00, .05), p = [.05, .10), p = [.10, .30)\}$. These strata allow for natural cutpoints of the propensity scores and for similar numbers of observations in each stratum (Xie, Brand, and Jann, 2012; also see Rosenbaum and Rubin, 1984). Following Xie et al.'s (2012: 329) recommendation, we ensure that each stratum includes at least 20 treatment observations and 20 control observations. Observations in the first stratum have the lowest likelihood of maternal incarceration, and those in the third stratum have the highest likelihood of maternal incarceration. Importantly, within each stratum, we restrict the analyses to regions of common support and ensure that there are no statistically significant differences in the control variables between the treatment and control groups. For example, in stratum 1, the treatment and control groups have a similar distribution of covariates and vary only by maternal incarceration. Including all variables used to generate the propensity score in the models estimating average effects

was not possible, as their inclusion precluded the within-stratum balance requirement of this propensity score matching approach (see Table A2 for the means across treatment and control groups of variables used in the heterogeneous treatment effect models).

We then estimate multilevel models. Level 1 estimates the effects of maternal incarceration on child well-being in each stratum, and Level 2 estimates the trend in the variation of effects by propensity score stratum. Again, all outcomes are estimated with OLS regression models. Because these multilevel models cannot be estimated with multiply imputed data, these models use only one imputed data set. The magnitude and statistical significance of the point estimates, however, remain substantively similar in robustness checks that use different single imputed data sets.

Although propensity score matching is a strategic method for estimating the effects of maternal incarceration, because it approximates an experimental design and ensures the treatment and control groups differ only in their experience of the treatment, this method only accounts for observed characteristics. We proceed under the assumption that no unobserved characteristics could render any observed effects of maternal incarceration statistically nonsignificant (the ignorability assumption, as discussed previously), and it is possible that unobserved characteristics—such as criminal activity or child maltreatment—exist. Therefore, both the estimates of average and heterogeneous effects cannot rule out the possibility that selection into incarceration rather than incarceration itself drives any observed association (Morgan and Harding, 2006). We conduct sensitivity analyses to consider this possibility more fully and return to this point in the discussion. All analyses were conducted with Stata (StataCorp, College Station, TX) (also see Becker and Caliendo, 2007; Jann, Brand, and Xie, 2007).

Results

Estimating the Average Effect of Maternal Incarceration on Child Well-Being

Table 2 presents estimates of the effect of maternal incarceration on four measures of child well-being: internalizing problem behaviors, externalizing problem behaviors, PPVT-III scores, and early juvenile delinquency. The unmatched differences are presented in the first column. These estimates suggest that children with incarcerated mothers, compared with their counterparts, have greater internalizing behaviors ($b = 0.105$, $p < .10$), greater externalizing behaviors ($b = 0.179$, $p < .01$), lower PPVT-III scores ($b = -0.130$, $p < .05$), and more early juvenile delinquency ($b = 0.279$, $p < .001$).

The matched differences, which match treatment observations to control observations via kernel matching, are presented in the next column. These matched differences show that, between the treatment and control groups, no substantively or statistically significant differences were found in internalizing problem behaviors, externalizing problem behaviors, PPVT-III scores, and early juvenile delinquency. Therefore, consistent with other research using these data that has considered the average effects (see Wildeman and Turney, 2014, which employed propensity score matching to estimate 21 caregiver- and teacher-reported problem behaviors), the results show that the unmatched differences likely result from social selection forces.

Estimating the Heterogeneous Effect of Maternal Incarceration on Child Well-Being

The previous estimates, which documented no robust average effect of maternal incarceration on child well-being, assumed that the effect of maternal incarceration is similar for all children. However, it is possible that the effects are heterogeneous, meaning that some children might suffer substantial harm and that others might considerably benefit from maternal incarceration. We next consider this possibility. We generate three propensity score strata, each of which include mothers in the treatment group and mothers in the control group that have a similar distribution of covariates.

Table 3 shows that mothers from the first stratum (those with the lowest propensity, or risk, for incarceration, with no more than a 5% risk) are more advantaged than mothers in the second stratum (those with a 5% to 10% risk of incarceration) and, especially, third stratum (those with a 10% to 30% risk of incarceration). For example, in stratum 1, just more than one third (36%) of mothers were non-Hispanic Black, compared with 56% in stratum 2 and stratum 3. Additionally, compared with their counterparts, mothers in stratum 1 are likely to have postsecondary education (54% compared with 42% in stratum 2 and 11% in stratum 3), are unlikely to have household incomes below the poverty line (27% compared with 36% in stratum 2 and 62% in stratum 3), are likely to be married to the focal child's father (53% compared with 27% in stratum 2 and 10% in stratum 3), and are unlikely to report depression (6% compared with 13% in stratum 2 and 28% in stratum 3). Furthermore, among mothers in stratum 1, only 4% shared a child with a previously incarcerated father, compared with 28% of mothers in stratum 2 and 68% of mothers in stratum 3.

Table 4 presents results from multilevel models estimating the heterogeneous effects of maternal incarceration. Recall that higher values indicate less favorable outcomes for internalizing problem behaviors, externalizing problem behaviors, and early juvenile delinquency and more favorable behaviors for PPVT scores. Turning first to estimates of internalizing problem behaviors, the Level 1 coefficients show that the effect of maternal incarceration varies across the three strata. Maternal incarceration is associated with one half of a standard deviation increase in internalizing problem behaviors in stratum 1 ($p < .01$), a small and statistically nonsignificant increase in internalizing problem behaviors in stratum 2, and a small and statistically nonsignificant decrease in internalizing problem behaviors in stratum 3. The Level 2 slope demonstrates that, for each unit change in stratum, there is a 0.235 standard deviation decrease in the effect of maternal incarceration ($p < .05$). Figure 1a provides a graphical depiction.

The results are nearly identical for externalizing problem behaviors and early juvenile delinquency. The Level 1 coefficients show that the effects of maternal incarceration are concentrated among individuals only in stratum 1 (for externalizing problem behaviors) and in both strata 1 and 2 (for early juvenile delinquency). The Level 2 coefficient shows that these between-strata differences are statistically significant. For example, maternal incarceration is associated with about a three fifths of a standard deviation increase in externalizing problem behaviors in stratum 1 ($p < .01$), a small and statistically nonsignificant increase in externalizing problems behaviors in stratum 2, and a small and statistically nonsignificant decrease in problem behaviors in stratum 3. The Level 2 slope shows, for each unit change in stratum, a 0.298 standard deviation decrease in externalizing

problem behaviors ($p < .01$) and a 0.251 standard deviation decrease in early juvenile delinquency ($p < .01$). Figures 1b and 1c provide graphical depictions.

The estimates for PPVT-III scores follow a similar pattern, with the largest coefficient for children of mothers least likely to be incarcerated and the smallest coefficient for children of mothers most likely to be incarcerated. But the between-stratum differences are not statistically significant, and therefore, we do not provide a graphical depiction of this relationship. See Appendix A for additional analyses that interrogate the robustness of these findings.

Discussion

Results Summary

Children of incarcerated mothers represent a growing and vulnerable population, and accordingly, a burgeoning literature has considered how maternal incarceration—above and beyond other disadvantages that are correlated with maternal incarceration—affects the well-being of children. But quantitative research, at least broadly representative quantitative research, has provided evidence of both deleterious (e.g., Hagan and Foster, 2012b; Huebner and Gustafson, 2007) and null (e.g., Wildeman and Turney, 2014) average effects, and qualitative research has documented that maternal incarceration may be deleterious, beneficial, or inconsequential (e.g., Arditti, 2012a; Giordano, 2010; Siegel, 2011; Turanovic et al., 2012). Therefore, in this article, we attempt to reconcile these findings by considering the heterogeneous effects of maternal incarceration on children.

We use data from the FFCWB—a data source that includes incarcerated mothers demographically similar to mothers incarcerated in jails, state prisons, and federal prisons (Wildeman and Turney, 2014)—and a series of propensity score matching models to estimate the effects of maternal incarceration on well-being among 9-year-old children, finding significant evidence of effect heterogeneity; the children least likely to experience this event suffer deleterious consequences, and the children most likely to experience this event suffer no statistically significant behavioral responses. One explanation for the statistically insignificant findings among children most likely to experience maternal incarceration, a disadvantaged group of children prior to maternal incarceration, could be that children stop accumulating adverse consequences once they reach a certain point of saturation (Hannon, 2003). A related explanation could be that maternal incarceration offers relief from other stressors such as domestic violence or economic deprivation (Wheaton, 1990). A final possibility is that because women who are most likely to experience incarceration are probably also most likely to be lost to attrition. Therefore, it is possible that the analytic sample excludes some mothers with a high propensity for experiencing incarceration and, therefore, make it difficult to find any statistically significant (positive) effects.

The evidence of heterogeneous effects complements both qualitative and quantitative research on maternal incarceration and, more broadly, contributes theoretically to research on the consequences of incarceration. Consistent with the nuanced qualitative research on maternal incarceration (Arditti, 2012a; Giordano, 2010; Siegel, 2011; Turanovic et al.,

2012), we show that maternal incarceration can harm some children and have no discernible effect on others. Importantly, we find no statistically significant positive effects of maternal incarceration that often has been described in the qualitative literature (e.g., Turanovic et al., 2012). This could be because these positive effects are not driven by characteristics associated with selection into incarceration. Alternatively, it could be that even the mothers with the highest propensities for incarceration in our sample (those with a 10% to 30% risk) were still not above a threshold that would produce consistently beneficial effects of incarceration. Although the coefficients for mothers with the highest propensities are not statistically significant, in the case of internalizing and externalizing problem behaviors, the direction of the coefficients suggests positive effects, and it is likely that some positive effects are counterbalanced by negative effects (Turney, 2014a; for research on father absence more generally, see Jaffee, Moffitt, Caspi, and Taylor, 2003). Indeed, as there are likely individual instances where maternal incarceration improves child well-being, future research should continue to test for positive effects of maternal incarceration and should consider that these positive effects could be driven by something other than the mother's propensity for incarceration. More generally, given that considering only the average effects of maternal incarceration masks considerable heterogeneity, both research and public policy surrounding the consequences of maternal incarceration should carefully consider treatment heterogeneity.

Relatedly, the results regarding effect heterogeneity bring together the three most rigorous, broadly representative analyses of the effects of maternal incarceration on children. For instance, in Hagan and Foster's (2012b) analysis of the Add Health data and Huebner and Gustafson's (2007) analysis of the NLSY79 data, approximately 1% and 2% of mothers were incarcerated, respectively. These analyses documented large, statistically significant negative effects of maternal incarceration, which is precisely in line with our findings for children of mothers least likely to be incarcerated (e.g., those with a propensity below 5%). Additionally, in Wildeman and Turney's (2014) analysis of the FFCWB data, where approximately 9% of mothers are incarcerated, they found statistically nonsignificant effects for 19 of the 21 outcomes considered. This result is consistent with what we find here for children of mothers with relatively high propensities for experiencing incarceration. Furthermore, although Wildeman and Turney (2014) did not consider variation by the propensity for experiencing maternal incarceration, they did consider race and ethnic differences in the relationship between maternal incarceration and caregiver-reported problem behaviors, finding evidence that maternal incarceration decreases problem behaviors among White children. Thus, seemingly divergent findings across prior research could be driven by the populations they represent, not by differences in statistical methods, children's ages, or outcomes.

More generally, these findings provide confidence that the effects—positive, negative, or null—of maternal incarceration across studies reflect the social reality of children's lives. This observation is especially true in conjunction with studies that found null effects of maternal incarceration in disadvantaged samples (e.g., Wildeman and Turney, 2014), studies that found that theoretically relevant moderators condition the effects of parental incarceration on children (e.g., Dallaire et al., 2014; Hanlon et al., 2005a, 2005b;

Poehlmann, 2005), and studies that suggested heterogeneity in the effects of incarceration on family life more broadly (Turney and Wildeman, 2013).

Limitations

Although the analyses do reconcile much prior research on this topic and contribute theoretically to broader research on the effects of incarceration, limitations exist. Importantly, not all families who participated in the baseline sample remained in the study at the 9-year survey, which was when the outcome variables were measured. Although descriptive analyses show small observed differences between the baseline and analytic samples, it is possible that there are additional *unobserved* differences between those who did and did not remain in the study. We suspect that those who do not remain in the study are more disadvantaged in their unobservable characteristics and, therefore, are more likely to be families with a high propensity for experiencing maternal incarceration. If we could retain these families, it is possible that maternal incarceration would have a protective effect on children with a high propensity for experiencing maternal incarceration.

Additionally, the propensity score matching models proceed under the ignorability assumption, which is the assumption that unobserved characteristics are not excluded when balancing across treatment and control groups (Morgan and Harding, 2006). Unmeasured characteristics—such as heritability or mothers' criminal history—could confound our results. The analyses, however, provide evidence that this is not a major concern. For one, the models estimating average effects document null effects. Also, the models estimating heterogeneous effects show that the negative statistically significant effects are concentrated among children of the least disadvantaged mothers. Indeed, if unobserved heterogeneity produced biased results, then we would likely find statistically significant negative effects among children of the *most* disadvantaged mothers. The Rosenbaum bounds also provide assurance that our results—the negative effects of maternal incarceration on children of the least disadvantaged mothers—are likely not unduly biased by omitted variables driving both maternal incarceration and poor child outcomes. However, absent a randomized control trial, we cannot undoubtedly rule out unmeasured heterogeneity, and therefore, our policy suggestions are contingent on being replicated with experimental data. Unlike research on the effects of paternal incarceration, where it is difficult to link disadvantaged men to their children through administrative records, linking disadvantaged mothers to their children is more straightforward and future research should undertake these analyses.

Other limitations, common among studies that examine the effects of maternal incarceration, exist. For one, the measure of maternal incarceration is crude. We cannot differentiate children of mothers who experienced short incarceration stays from those who experienced lengthy ones. We also cannot distinguish between prison or jail incarceration, have no data about the distance between the incarcerated mother and her child, and lack information on earlier stages of criminal justice contact (e.g., arrest) or family circumstances immediately prior to maternal incarceration, all of which could influence child well-being (Dallaire et al., 2014; Sampson, 2014). Also, too few mothers were incarcerated at each wave to consider how the timing or chronicity of maternal incarceration may affect child well-being. Future studies of child well-being, especially those with nationally representative and population-

based samples, should collect information about these details to facilitate a more nuanced understanding of the heterogeneous effects of maternal incarceration and the mechanisms underlying these effects.

Implications for Public Policy and Conclusions

The implications of these results for public policy are difficult to disentangle, especially because the analytic strategy lacks a true experimental design, and we thus hope this article launches both additional research on the effects of maternal incarceration on children and a conversation about how public policy could minimize the consequences of maternal incarceration for children.

First, it is important to discuss the public policy implications of our null findings. We find that, for children of mothers more likely to experience incarceration (those in stratum 2 and stratum 3), maternal incarceration is not independently associated with deleterious outcomes in children, which is in line with findings from other research that has considered the average effects of incarceration with these data (Wildeman and Turney, 2014). Importantly, children of mothers with a high propensity for experiencing incarceration are an extremely disadvantaged group, and it is likely that the relative influence of these other disadvantages—compared with maternal incarceration—drive unfavorable outcomes for these children. Therefore, although reducing maternal incarceration could do little to benefit these children, public policy might instead focus on issues that disproportionately affect children of mothers with a high likelihood of incarceration, such as alleviating poverty or increasing access to substance abuse treatment. Furthermore, as it is possible that these children simply learn how to cope with maternal incarceration, public policy efforts could be directed toward social service programs that help children and families adapt to maternal incarceration, perhaps by striving to increase cooperation and support among children’s caregivers, additional family members, and teachers.

Next, we focus our public policy discussion on the group of children who, in our analyses, suffer the most substantial consequences of maternal incarceration: children of mothers who are unlikely to experience incarceration (those with a 0% to 5% risk). For children of mothers unlikely to experience incarceration, the negative consequences of maternal incarceration could be driven by at least three factors, all of which may be operating simultaneously and all of which potentially call for different policy interventions: (a) jail incarceration as opposed to prison incarceration, (b) incarceration for a crime that did minimal—or no—harm to their children, and (c) inadequate family supports for coping with maternal incarceration. We consider each of these points in the following paragraphs.

For one, it is possible that the negative effects of maternal incarceration among children of mothers unlikely to experience incarceration are driven by the conditions of confinement (specifically, prison incarceration compared with jail incarceration). It is possible that because mothers with a low propensity for incarceration are more likely than their counterparts with a higher propensity for incarceration to be experiencing incarceration for the first time, they may be more likely to be incarcerated in jails than prisons. Because jails are usually located closer to pre-incarceration residences than prisons, they facilitate easier visitation that could be traumatic for either the mother or the child. Relatedly, jail stays

are generally shorter than prison stays, which means that children of mothers incarcerated in jail experience more family instability than children of mothers incarcerated in prison. Unfortunately, these data, like most other data on maternal incarceration, do not allow us to differentiate between jail and prison incarceration (or other types of incarceration experiences, as discussed at length previously). This, of course, makes it difficult to know what is driving the effects, and calls both for heavier reliance on qualitative research and for better information on the conditions of confinement. We do not have information about the conditions of confinement experienced by mothers with a low propensity for incarceration (whose children respond poorly to their incarceration) or how those conditions of confinement differ from those of mothers with a higher propensity for incarceration (whose children show no effects). As we lack information on the conditions of confinement, this public policy conversation will be best had after research with more information on these features of incarceration has been conducted.

A second possibility is that mothers with a low propensity to experience incarceration were disproportionately committing crimes that did little harm to their children prior to their incarceration—and, by extension, could have had relatively few broader consequences for society prior to their incarceration. If this assumption is true, then this—in conjunction with our findings about the deleterious effects on children of these mothers—leads to public policy suggestions that are relatively easy to follow: Rely on criminal justice interventions other than incarceration for low-level offenses, with an emphasis on decriminalizing possession of marijuana and other petty offenses (especially minor public order offenses). Yet the difficulty is that the data do not allow us to know whether the mothers with a low propensity for incarceration are those incarcerated for the least serious crimes, although this assumption is plausible.

A third possibility is that families, like inmates (see the review in Wildeman, Turney, and Schnittker, 2014), learn how to cope with incarceration. In this regard, it might be the case that mothers who have previously experienced incarceration or families who have previously experienced paternal incarceration have a better strategy in place for dealing with maternal incarceration—possibly because the parent is periodically absent for other reasons—than do families in which incarceration comes as more of a shock. This possibility, it seems to us, is eminently reasonable, and it calls for a different public policy intervention. Specifically, this possibility suggests that family interventions—whether through the provision of childcare or some other direct intervention—that focus on families experiencing incarceration for the first time might especially help the children experiencing that event. Unfortunately, because we do not know the direct mechanisms through which these effects might operate—through social psychological trauma, a reduction in childcare, or some other avenue—and there are very few randomized control trials evaluating such interventions, it is difficult to know what policy shift might be successful.

In closing, although we cannot say anything definitive regarding public policy, the data and corresponding discussion provide some insights as to how policies might respond to children of incarcerated mothers, especially children unlikely to experience maternal incarceration. These analyses, which provide the first broadly representative quantitative evidence about heterogeneity in the relation between maternal incarceration and child well-

being, make three essential contributions to the research on the consequences of maternal incarceration for children. First, we show that the effect heterogeneity strongly motivated within qualitative research (e.g., Arditti, 2012a; Giordano, 2010; Siegel, 2011; Turanovic et al., 2012) and across quantitative research (e.g., Foster and Hagan, 2013; Wildeman and Turney, 2014) also can be detected in population-based quantitative data by testing for heterogeneous treatment effects (e.g., effects by the propensity for experiencing maternal incarceration). Second, they bring together the seemingly disparate findings from previous quantitative research, as we find substantial detrimental effects on children of mothers very unlikely to be incarcerated, as has previous research (e.g., Hagan and Foster, 2012b; Huebner and Gustafson, 2007), and no evidence of detrimental effects on children of mothers most likely to be incarcerated, as has previous research (Wildeman and Turney, 2014). Finally, and most importantly, our analyses provide an important “reality check” for those critical of the great emphasis placed on the effects of mass incarceration, relative to the effects of criminality and other forms of disadvantage, on families and children (Giordano, 2010; Johnston, 2006; Sampson, 2011). By documenting the point at which the effects of maternal incarceration shift from harmful to nonexistent, we show that the deleterious consequences of maternal incarceration for children are limited to those unlikely to experience that event. In this regard, to construct the most accurate social ledger of incarceration possible and to broaden understanding about the implications of mass imprisonment for inequality (Sampson, 2011), future research must seriously consider the heterogeneous effects of paternal incarceration on children.

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Biographies

Kristin Turney is an assistant professor of sociology at the University of California—Irvine. Her research investigates the complex, dynamic role of families in creating and exacerbating social inequalities. Specifically, she examines the collateral consequences of incarceration for family life, the effects of depression on individuals and children, and the causes and consequences of childhood health inequalities. These substantive interests are accompanied with a methodological interest in causal inference.

Christopher Wildeman is an associate professor in the Department of Policy Analysis and Management at Cornell University and a visiting fellow at the Bureau of Justice Statistics. His research considers (a) the consequences of mass imprisonment for inequality, with emphasis on families, health, and children; and (b) child maltreatment and the foster care system. He is the 2013 recipient of the Ruth Shonle Cavan Young Scholar Award from the American Society of Criminology, and his first book (with Sara Wakefield) *Children of the Prison Boom: Mass Incarceration and the Future of American Inequality* was published by Oxford University Press in 2013.

Appendix A.

Robustness Checks

It is possible that this striking pattern of findings results from (a) the measurement of maternal incarceration or (b) the reliance on caregiver-reported problem behaviors. We investigate these two possibilities in a series of robustness checks.

First, we replace the measure of maternal incarceration with a more conservative measure of incarceration. In this conservative measure, we code incarceration affirmatively if there is direct or indirect evidence of incarceration (and *not* if mothers were reported to be “never incarcerated” at the 1-year interview and then reported to have been “ever incarcerated” at a subsequent interview with no additional evidence of incarceration). This alternative specification—which, because of the smaller number of mothers considered incarcerated ($N = 153$), necessitates examining differences across only two strata—produces similar findings. These results show that, for children of mothers with a low propensity for incarceration (those in stratum 1), maternal incarceration is associated with large and statistically significant increases in problem behaviors ($b = 1.106$, $p < .001$ for internalizing problem behaviors; $b = 0.875$, $p < .001$ for externalizing problem behaviors; $b = 0.734$, $p < .01$ for early juvenile delinquency), but there is no effect for children of mothers with a high propensity for incarceration (those in stratum 2). The Level 2 coefficients show that the between-stratum differences are statistically significant ($p < .001$ for internalizing problem behaviors, $p < .001$ for externalizing problem behaviors, and $p < .01$ for early juvenile delinquency).

In the second set of robustness checks, we estimate both teacher and child reports of problem behaviors at the 9-year interview. Teacher-reported problem behaviors are measured by responses to the internalizing and externalizing scales of the Social Skills Rating System (Gresham and Elliott, 2007). Child-reported internalizing and externalizing problem behaviors are measured by responses to the Self-Description Questionnaire (Marsh, 1990). Because not all teachers and children were interviewed, these analyses necessitate relying on fewer observations ($N = 2,004$ for teacher-reported behaviors and $N = 3,008$ for child-reported behaviors). The patterns of results are consistent with those estimating caregiver-reported problem behaviors. Children in stratum 1 experienced increases in teacher-reported internalizing ($b = 0.259$, $p < .05$) and externalizing ($b = 0.262$, $p < .05$) problem behaviors as a result of maternal incarceration. The between-stratum differences, shown by the Level 2 coefficients, are statistically significant in estimates of teacher-reported internalizing problem behaviors ($p < .01$) but not in estimates of teacher-reported externalizing behaviors ($p = .118$). Additionally, children in stratum 1 experience increases in child-reported internalizing ($b = 0.262$, $p < .05$) and externalizing ($b = 0.374$, $p < .01$) problem behaviors, and the between-stratum differences are statistically significant ($p < .05$ for both child-reported internalizing and externalizing problem behaviors). The results are consistent when restricting the sample to children with mother-reported outcomes. Therefore, the similarities of caregiver-reported findings to those of teacher- and child-reported findings suggest the data are both valid and reliable.

Sensitivity Analyses

The preceding analyses suggest that the negative consequences of maternal incarceration are concentrated among children unlikely to experience maternal incarceration. It is still possible that these effects result from social selection forces. To investigate this possibility, we present results from Rosenbaum bounds sensitivity analyses, which evaluate how sensitive the propensity score results are to unobserved characteristics (results not shown but available upon request). These unobserved characteristics can be correlated with selection into incarceration. We restrict these Rosenbaum bounds to those observations where we find significant effects, those in stratum 1 ($n = 814$). These findings show that any unobserved characteristics not included in the propensity score would have to increase the odds of being incarcerated by 70% ($\Gamma = 1.7$) for internalizing problem behaviors, by 130% ($\Gamma = 2.3$) for externalizing problem behaviors, and by 150% ($\Gamma = 2.5$) for early juvenile delinquency. To contextualize just how substantial a missing source of unobserved heterogeneity would have to be to render our results statistically nonsignificant, consider the results from the logistic regression model estimating the propensity score (not presented). Those results show that exposure to domestic violence is associated with only a 60% increase in the odds of incarceration. Similarly, maternal substance use during pregnancy and paternal incarceration, respectively, are associated with a 110% and 30% increase in the odds of incarceration. Thus, unobserved selection forces would need to be substantial to render these results statistically nonsignificant.

Table A1.

Descriptive Statistics of Variables Used in Analyses

Variable	Baseline Sample		Analytic Sample	
	Mean	(SD)	Mean	(SD)
Mother incarceration (y3, y5, y9)	0.081		0.089	
Mother race (b)				
Non-Hispanic White	0.211		0.205	
Non-Hispanic Black	0.476		0.504	*
Hispanic	0.273		0.258	
Non-Hispanic other race	0.040		0.034	
Mother and father a mixed-race couple (b)	0.149		0.144	
Mother foreign-born (b)	0.170		0.135	***
Mother age (b)	25.278	(6.052)	24.997	(5.991) *
Mother lived with both biological parents at age 15 (b)	0.433		0.411	†
Mother education (b)				
Less than high school	0.347		0.331	
High-school diploma or GED	0.303		0.317	
Postsecondary education	0.350		0.352	
Father education (b)				
Less than high school	0.324		0.321	
High-school diploma or GED	0.361		0.382	†

Variable	Baseline Sample		Analytic Sample	
	Mean	(SD)	Mean	(SD)
Postsecondary education	0.315		0.297	†
Mother in poverty (y1)	0.408		0.421	
Mother material hardship (y1)	1.148	(1.649)	1.161	(1.629)
Mother employment (y1)	0.529		0.553	*
Father employment (y1)	0.786		0.764	*
Mother lives with child's grandparent (y1)	0.188		0.190	
Mother relationship with child's father (y1)				
Married	0.301		0.285	
Cohabiting	0.273		0.277	
Nonresidential romantic	0.098		0.101	
Separated	0.328		0.338	
Mother has new partner (y1)	0.113		0.119	
Mother relationship quality (y1)	3.305	(1.412)	3.263	(1.412)
Mother number of children in household (y1)	2.305	(1.333)	2.326	(1.325)
Mother parenting stress (y1)	2.180	(0.675)	2.179	(0.673)
Mother depression (y1)	0.155		0.155	
Child male (b)	0.524		0.520	
Child born low birth weight (b)	0.102		0.093	
Child temperament (y1)	0.568	(0.128)	0.567	(0.128)
Mother smoked during pregnancy (b)	0.195		0.191	
Mother used drugs or drank alcohol during pregnancy (b)	0.136		0.123	†
Mother has substance abuse problem (y1)	0.018		0.014	
Father has substance abuse problem (b, y1)	0.169		0.185	†
Mother impulsivity (y5)	1.531	(0.484)	1.526	(0.483)
Father impulsivity (y1)	1.987	(0.668)	2.034	(0.668) **
Mother reports domestic violence (b, y1)	0.075		0.076	
Mother previously incarcerated (b, y1)	0.009		0.007	
Father previously incarcerated (b, y1)	0.298		0.328	**
<i>N</i>	4,897 ^a		3,197	

Notes. Timing of measurement of all variables in parentheses (b = baseline interview, y1 = 1-year interview, y3 = 3-year interview, y5 = 5-year interview, y9 = 9-year interview). Internalizing problem behaviors and externalizing problem behaviors reported by children's caregivers. Early juvenile delinquency reported by children.

^a *N*s vary across baseline sample because of item nonresponse.

† $p < .10$.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table A2.

Means of Covariates by Maternal Incarceration and Propensity Score Strata

Variable	Stratum 1 <i>p</i> = [.00, .05)		Stratum 2 <i>p</i> = [.05, .10)		Stratum 3 <i>p</i> = [.10, .30)	
	$E(X) d = 1$	$E(X) d = 0$	$E(X) d = 1$	$E(X) d = 0$	$E(X) d = 1$	$E(X) d = 0$
Mother race						
Non-Hispanic White	0.174	0.242	0.283	0.280	0.212	0.193
Non-Hispanic Black	0.435	0.354	0.556	0.558	0.576	0.558
Hispanic	0.391	0.404	0.161	0.162	0.212	0.249
Mother foreign-born	0.348	0.433	0.020	0.037	0.000	0.000
Mother lived with both biological parents at age 15	0.652	0.683	0.333	0.366	0.238	0.245
Mother less than high school	0.174	0.175	0.192	0.159	0.702	0.667
Mother employment	0.696	0.786	0.646	0.630	0.219	0.257
Mother co-resident with child's father	0.913	0.852	0.566	0.547	0.238	0.328
Mother depression	0.130	0.055	0.091	0.129	0.305	0.273
Father previously incarcerated	0.043	0.043	0.303	0.273	0.728	0.675
<i>N</i>	26	788	99	1,140	151	807

Notes. $E(X) | d = 0$ indicates means for not incarcerated mothers. $E(X) | d = 1$ indicates means for incarcerated mothers. Mothers in stratum 1 have the lowest propensity for incarceration, and mothers in stratum 3 have the highest propensity for incarceration.

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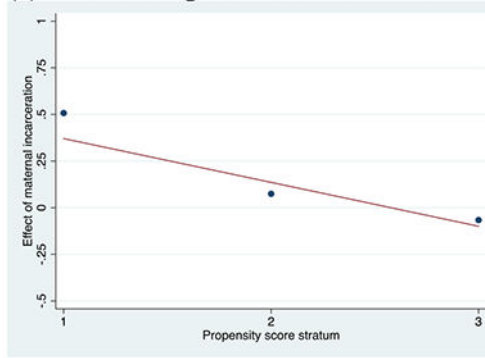
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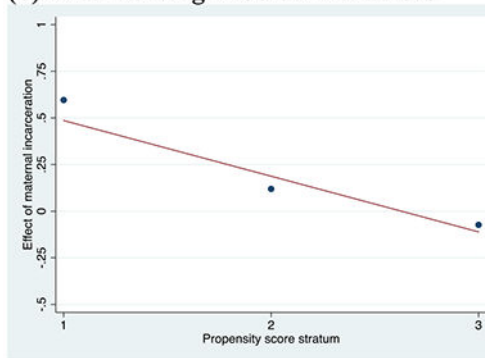
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(a) Internalizing Problem Behaviors



(b) Externalizing Problem Behaviors



(c) Early Juvenile Delinquency

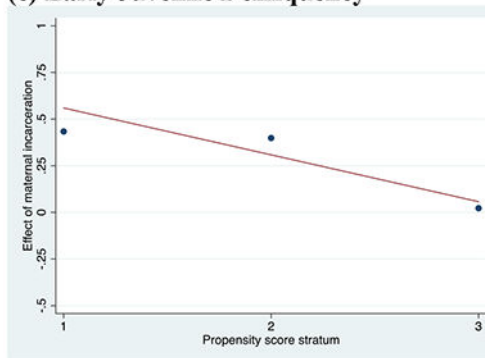


Figure 1.
Heterogeneous Treatment Effects of Maternal Incarceration on Children’s Well-Being

Table 1.

Descriptive Statistics of Variables Used in the Analysis

Variable	Mean	(SD)	Minimum	Maximum
Dependent Variables				
Internalizing problem behaviors (y9)	0.160	(0.179)	0	2
Externalizing problem behaviors (y9)	0.180	(0.197)	0	2
PPVT-III (y9)	92.859	(14.843)	37	159
Early juvenile delinquency (y9)	1.238	(1.766)	0	17
Independent Variable				
Mother incarceration (y3, y5, y9)	0.089			
Control variables				
Mother race (b)				
Non-Hispanic White	0.205			
Non-Hispanic Black	0.504			
Hispanic	0.258			
Non-Hispanic other race	0.034			
Mother and father a mixed-race couple (b)	0.144			
Mother foreign-born (b)	0.135			
Mother age (b)	24.997	(5.991)	14	47
Mother lived with both biological parents at age 15 (b)	0.411			
Mother education (b)				
Less than high school	0.331			
High-school diploma or GED	0.317			
Postsecondary education	0.352			
Father education (b)				
Less than high school	0.321			
High-school diploma or GED	0.382			
Postsecondary education	0.297			
Mother in poverty (y1)	0.421			
Mother material hardship (y1)	1.161	(1.629)	0	9
Mother employment (y1)	0.553			
Father employment (y1)	0.764			
Mother lives with child's grandparent (y1)	0.190			
Mother relationship with child's father (y1)				
Married	0.285			
Cohabiting	0.277			
Nonresidential romantic	0.101			
Separated	0.338			
Mother has new partner (y1)	0.119			
Mother relationship quality (y1)	3.263	(1.412)	1	5
Mother number of children in household (y1)	2.326	(1.325)	0	10
Mother parenting stress (y1)	2.179	(0.673)	1	4

Variable	Mean	(SD)	Minimum	Maximum
Mother depression (y1)	0.155			
Child male (b)	0.520			
Child born low birth weight (b)	0.093			
Child temperament (y1)	0.567	(0.128)	0	1
Mother smoked during pregnancy (b)	0.191			
Mother used drugs or drank alcohol during pregnancy (b)	0.123			
Mother has substance abuse problem (y1)	0.014			
Father has substance abuse problem (b, y1)	0.185			
Mother impulsivity (y5)	1.526	(0.483)	1	4
Father impulsivity (y1)	2.034	(0.668)	1	4
Mother reports domestic violence (b, y1)	0.076			
Mother previously incarcerated (b, y1)	0.007			
Father previously incarcerated (b, y1)	0.328			
<i>N</i>			3,197	

Notes. Timing of measurement of all variables in parentheses (b = baseline interview, y1 = 1-year interview, y3 = 3-year interview, y5 = 5-year interview, y9 = 9-year interview). Internalizing problem behaviors and externalizing problem behaviors reported by children's caregivers. Early juvenile delinquency reported by children.

Table 2.

Propensity Score Matching Estimates of the Average Effect of Material Incarceration on Child Well-Being

Dependent variable	Unmatched	Matched
Internalizing problem behaviors	0.105 † (0.062)	0.016 (0.067)
Externalizing problem behaviors	0.179 ** (0.062)	-0.026 (0.071)
PPVT-III	-0.130 * (0.062)	0.023 (0.060)
Early juvenile delinquency	0.279 *** (0.062)	0.101 -0.083
Treatment <i>N</i>	285	285
Control <i>N</i>	2,912	2,912

Notes. Internalizing problem behaviors and externalizing problem behaviors reported by children's caregivers. Early juvenile delinquency reported by children. Propensity scores are estimated with a logistic regression model estimating maternal incarceration as a function of pre-incarceration covariates. Standard errors in parentheses.

†
 $p < .10$.

*
 $p < .05$.

**
 $p < .01$.

 $p < .001$ (two-tailed tests).

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Table 3.

Means of Covariates by Propensity Score Strata

Variable	Stratum 1	Stratum 2	Stratum 3
	<i>p</i> = [.00, .05]	<i>p</i> = [.05, .10]	<i>p</i> = [.10, .30]
Mother race (b)			
Non-Hispanic White	0.171	0.260	0.176
Non-Hispanic Black	0.356	0.558	0.561
Hispanic	0.403	0.162	0.243
Non-Hispanic other race	0.069	0.020	0.020
Mother and father a mixed-race couple (b)	0.133	0.140	0.159
Mother foreign-born (b)	0.430	0.036	0.000
Mother age (b)	27.565	25.203	22.360
Mother lived with both biological parents at age 15 (b)	0.681	0.363	0.244
Mother education (b)			
Less than high school	0.175	0.161	0.672
High-school diploma or GED	0.287	0.416	0.214
Postsecondary education	0.537	0.423	0.114
Father education (b)			
Less than high school	0.252	0.249	0.465
High-school diploma or GED	0.296	0.424	0.401
Postsecondary education	0.453	0.327	0.135
Mother in poverty (y1)	0.271	0.357	0.622
Mother material hardship (y1)	0.722	1.136	1.576
Mother employment (y1)	0.783	0.631	0.251
Father employment (y1)	0.895	0.790	0.618
Mother lives with child's grandparent (y1)	0.126	0.186	0.256
Mother relationship with child's father (y1)			
Married	0.534	0.265	0.096
Cohabiting	0.319	0.284	0.218
Nonresidential romantic	0.044	0.109	0.141
Separated	0.102	0.342	0.545
Mother has new partner (y1)	0.020	0.122	0.201
Mother relationship quality (y1)	3.836	3.260	2.752
Mother number of children in household (y1)	2.159	2.260	2.511
Mother parenting stress (y1)	2.098	2.140	2.294
Mother depression (y1)	0.057	0.126	0.278
Child male (b)	0.545	0.501	0.525
Child born low birth weight (b)	0.074	0.095	0.109
Child temperament (y1)	0.584	0.575	0.570
Mother smoked during pregnancy (b)	0.059	0.180	0.313
Mother used drugs or drank alcohol during pregnancy (b)	0.074	0.125	0.166
Mother has substance abuse problem (y1)	0.006	0.007	0.032

Variable	Stratum 1	Stratum 2	Stratum 3
	<i>p</i> = [.00, .05)	<i>p</i> = [.05, .10)	<i>p</i> = [.10, .30)
Father has substance abuse problem (b, y1)	0.084	0.163	0.304
Mother impulsivity (y5)	1.465	1.485	1.625
Father impulsivity (y1)	1.871	1.988	2.237
Mother reports domestic violence (b, y1)	0.036	0.051	0.144
Mother previously incarcerated (b, y1)	0.000	0.003	0.018
Father previously incarcerated (b, y1)	0.043	0.275	0.684
<i>N</i>	811	1,239	958

Notes. Timing of measurement of all variables in parentheses (b = baseline interview, y1 = 1-year interview, y3 = 3-year interview, y5 = 5-year interview, y9 = 9-year interview). Mothers in stratum 1 have the lowest propensity for incarceration, and mothers in stratum 3 have the highest propensity for incarceration.

Table 4.

Propensity Score Matching Estimates of the Heterogeneous Effects of Maternal Incarceration on Child Well-Being

Dependent variable	Level 1			Level 2
	Stratum 1	Stratum 2	Stratum 3	Trend
	<i>p</i> = [0, .05)	<i>p</i> = [.05, .10)	<i>p</i> = [.10, .30)	
Internalizing problem behaviors	0.508 ** (0.195)	0.074 (0.092)	-0.066 (0.096)	-0.235 * (0.096)
Externalizing problem behaviors	0.596 ** (0.173)	0.119 (0.096)	-0.073 (0.101)	-0.298 ** (0.094)
PPVT-III	-0.147 (0.233)	-0.102 (0.106)	0.021 (0.076)	0.102 (0.097)
Early juvenile delinquency	0.434 * (0.177)	0.398 *** (0.106)	0.022 (0.093)	-0.251 ** (0.092)
Treatment <i>N</i>	26	99	151	
Control <i>N</i>	788	1,140	807	

Notes. Internalizing problem behaviors and externalizing problem behaviors reported by children's caregivers. Early juvenile delinquency reported by children. Propensity scores are estimated with a logistic regression model estimating maternal incarceration as a function of pre-incarceration covariates. Mothers in stratum 1 have the lowest propensity for incarceration, and mothers in stratum 3 have the highest propensity for incarceration. Standard errors are in parentheses.

*
p < .05.

**
p < .01.

p < .001 (two-tailed tests).