

# The Unequal Consequences of Mass Incarceration for Children

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**Abstract** A growing literature has documented the mostly deleterious intergenerational consequences of paternal incarceration, but less research has considered heterogeneity in these relationships. In this article, I use data from the Fragile Families and Child Wellbeing Study ( $N = 3,065$ ) to estimate the heterogeneous relationship between paternal incarceration and children's problem behaviors (internalizing behaviors, externalizing behaviors, and early juvenile delinquency) and cognitive skills (reading comprehension, math comprehension, and verbal ability) in middle childhood. Taking into account children's risk of experiencing paternal incarceration, measured by the social contexts in which children are embedded (e.g., father's residential status, poverty, neighborhood disadvantage) reveals that the consequences—across all outcomes except early juvenile delinquency—are more deleterious for children with relatively low risks of exposure to paternal incarceration than for children with relatively high risks of exposure to paternal incarceration. These findings suggest that the intergenerational consequences of paternal incarceration are more complicated than documented in previous research and, more generally, suggest that research on family inequality consider both differential selection into treatments and differential responses to treatments.

**Keywords** Children's well-being · Family instability · Fragile Families and Child Wellbeing Study · Heterogeneous treatment effects · Paternal incarceration

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## Introduction

The rapid growth of mass incarceration in the United States means that a historically unprecedented number of children experience parental incarceration, especially paternal incarceration (Pettit 2012; Wakefield and Uggen 2010; Wildeman 2009). Given the absolute number of children affected by paternal incarceration, scholars have increasingly considered the intergenerational consequences of this confinement. By and large, research has documented that paternal incarceration has deleterious consequences for children across the life course (for reviews, see Eddy and Poehlmann 2010; Foster and Hagan 2015; Johnson and Easterling 2012; Murray et al. 2012a; Wildeman and Western 2010; Wildeman et al. 2013) and, given its concentration among the disadvantaged, may increase inequality among children (Wakefield and Wildeman 2013).

Research on the intergenerational consequences of paternal incarceration most often considers the average effects, paying particular attention to disentangling the effects of incarceration from the effects of other factors associated with incarceration such as poverty, neighborhood disadvantage, and criminal behaviors (Johnson and Easterling 2012). However, good reasons exist to suspect the same factors that shape children's risk of experiencing paternal incarceration—the demographic, socioeconomic, and behavioral characteristics of their parents—also shape children's responses to paternal incarceration (Giordano and Copp 2015; Turney and Wildeman 2015). On the one hand, the deleterious consequences might be strongest for children with relatively low risks of experiencing paternal incarceration; for these children, paternal incarceration may be a stressor that leads to especially deleterious outcomes. On the other hand, paternal incarceration may be most consequential for children with relatively high risks of experiencing paternal incarceration.

In this article, I consider the unequal consequences of paternal incarceration for children. I do so by building upon existing research that has mostly examined the average intergenerational consequences of paternal incarceration. I use data from the Fragile Families and Child Wellbeing Study (FFCWB), a longitudinal cohort of children born to mostly unmarried parents living in urban areas. Nearly one-third of the children in this sample experienced paternal incarceration by age 9. I estimate the heterogeneous consequences of paternal incarceration for children's problem behaviors and cognitive skills in middle childhood, investigating whether the consequences of paternal incarceration vary by the social contexts that shape children's risk of experiencing paternal incarceration (Giordano and Copp 2015). Problem behaviors and cognitive skills shape educational attainment, occupational attainment, and delinquency throughout the life course (Farkas 2003; Heckman et al. 2006; Moffitt 1993; Nagin and Tremblay 1999). Therefore, documenting the heterogeneous intergenerational consequences of paternal incarceration for children's well-being is crucial for constructing an “incarceration ledger”—defined by Sampson (2011) as the countervailing costs and benefits of incarceration—and precisely documenting how incarceration contributes to intergenerational social inequality (Featherman and Hauser 1978; Wakefield and Wildeman 2013).

## Background

### Linking Paternal Incarceration and Children's Well-being

Paternal incarceration may be a turning point in the life course of children that has cascading consequences for their well-being. The majority of incarcerated men are fathers (Mumola 2000), and many of them contribute economically and emotionally to their families prior to incarceration (Geller et al. 2011; Turanovic et al. 2012). Scholars have posited a variety of pathways through which paternal incarceration has, on average, negative consequences for children. Children may experience trauma resulting from the removal of fathers from households via incarceration (Hagan and Dinovitzer 1999). This trauma, as well as the corresponding ambiguous loss, where incarcerated fathers are both physically and emotionally absent, may hinder children's behavioral and cognitive development (Boss 2007; Sharkey 2010). Relatedly, children of incarcerated fathers may experience stigma and shame that impedes their social interactions and learning (Braman 2004; McKown and Weinstein 2003). Paternal incarceration may also generate massive strain on many aspects of family life that are consequential for children's well-being (e.g., Arditti 2015; Carlson and Corcoran 2001; Turney and Wildeman 2013).

### Motivating Heterogeneous Consequences of Paternal Incarceration

The social contexts of children's lives, especially the familial contexts that are particularly salient for young children, are crucial to their well-being (Bronfenbrenner and Morris 1998). Young children—based on the demographic, socioeconomic, and behavioral characteristics of their parents—have different risks for experiencing paternal incarceration. In an era of mass incarceration, the incarcerated population includes low-level offenders drawn into the system who likely would not have been incarcerated in prior eras (Travis et al. 2014). Thus, those who do experience paternal incarceration are quite heterogeneous, with some children having relatively low risks of exposure, other children having relatively moderate risks of exposure, and still other children having relatively high risks of exposure. There are good reasons to expect that children's risks of experiencing paternal incarceration also shapes children's responses to paternal incarceration.

#### *Paternal Incarceration as an Event Stressor*

On the one hand, the negative intergenerational consequences of paternal incarceration may be strongest among children living in social contexts—measured by the demographic, socioeconomic, and behavioral characteristics of their parents—that place them at a low risk of exposure to paternal incarceration. Children with low risks of exposure, prior to their father's confinement, have otherwise relatively advantaged lives. For example, these children generally have stable home environments, are shielded from severe economic deprivation, and live in resourceful neighborhoods (Wakefield and Wildeman 2013). For children from these families, paternal incarceration may be an *event stressor*—that is, a life event that is especially detrimental to well-being because of its unanticipated nature (Eaton 1978; Wheaton 1982; also see Wheaton 1990). Therefore, for children with low

risks of exposure, incarceration may be a distinctive shock that makes them vulnerable to incarceration's deleterious consequences.

Furthermore, the social disruption resulting from incarceration in low-risk families may have especially deleterious consequences for children through the following pathways: strain imposed on familial economic resources, dissolution and disruption of parental relationships, impairment of parenting behaviors, and weakening of maternal health. For example, incarceration produces economic insecurity among families (Comfort 2008; Schwartz-Soicher et al. 2011; Western 2006), and economic insecurity is linked to both problem behaviors and cognitive skills in children (Carlson and Corcoran 2001; Duncan et al. 1994). Quite plausibly, the adverse economic consequences of incarceration are largest when children have a low risk of experiencing paternal incarceration. These children, compared with their counterparts with a moderate or high risk, are likely to have employed fathers who make substantial economic contributions to their families prior to incarceration. The economic loss resulting from incarceration may be especially detrimental for these families that rely on fathers' economic resources. Therefore, for children with a low risk of experiencing paternal incarceration, family economic well-being may be a mechanism linking paternal incarceration to children's well-being.

Family instability may be another pathway linking paternal incarceration to well-being among children with a low risk of experiencing paternal incarceration. Incarceration disrupts romantic relationships (Apel et al. 2010; Lopoo and Western 2005; Massoglia et al. 2011; Western 2006), and the consequences of incarceration for romantic relationships may be strongest among those with a low risk of experiencing incarceration. These fathers are likely in romantic relationships with the mothers of their children, and the shock of incarceration may create conflict and instability in relationships that does not occur when incarceration is an anticipated event. Relationship instability, in turn, increases children's problem behaviors and decreases children's cognitive skills (Osborne and McLanahan 2007). Similarly, parenting behaviors and maternal health—both of which are linked to children's well-being (Hawkins et al. 2007; Turney 2011)—may be most impaired when fathers have a low risk of experiencing incarceration (Turney 2014).

### *Paternal Incarceration as a Chronic Stressor*

On the other hand, the negative intergenerational consequences of paternal incarceration may be strongest among children with a high risk of exposure to paternal incarceration. Children with a high risk of exposure do not experience incarceration in isolation. Instead, prior to fathers' confinement, these children experience a complex array of disadvantages. Their family lives are fraught with instability, poverty, and disadvantaged neighborhood environments (Wakefield and Wildeman 2013). For these children, paternal incarceration may be one of many cascading *chronic stressors*—that is, stressors that emerge gradually from social environments and have deleterious effects on well-being (Pearlin 1989). Therefore, this accumulation of disadvantage (in the form of chronic stressors) may render paternal incarceration especially associated with children's problem behaviors and cognitive skills (DiPrete and Eirich 2006). For example, among children living in poverty, paternal incarceration may strain already

tight economic resources or already tumultuous relationships, or impede mothers' ability to protect children from deleterious effects of paternal incarceration.

## Existing Evidence

### *Average Consequences of Paternal Incarceration*

A rapidly growing literature has documented the consequences of paternal incarceration for children. This research has consistently found negative average associations between paternal incarceration and a range of behavioral problems in early childhood (Geller et al. 2009, 2012; Haskins 2014; Wakefield and Wildeman 2011; Wildeman 2010); middle childhood (Haskins 2015; Johnson 2009; Wilbur et al. 2007); adolescence (Johnson 2009; Wakefield and Wildeman 2011); and adulthood (Murray and Farrington 2005, 2008; for research on the effects of maternal incarceration on offspring well-being, see Wildeman and Turney 2014). In contrast, research on children's cognitive skills has yielded more nuanced findings. Some research using the FFCWB has documented null associations between paternal incarceration and children's verbal ability at age 3 (Geller et al. 2009) and age 5 (Geller et al. 2012; Haskins 2014). Moving beyond cognitive skills in early childhood, though, children with incarcerated parents are more likely than their counterparts to be placed in special education (Haskins 2014) and to be retained in elementary school (Turney and Haskins 2014); children of incarcerated parents also have lower educational attainment (Foster and Hagan 2007, 2009; Hagan and Foster 2012), more school absences (Nichols and Loper 2012), and worse high school academic performance (Foster and Hagan 2009; Hagan and Foster 2012; Murray et al. 2012b).

### *Heterogeneous Consequences of Paternal Incarceration*

Although no research has considered variation in the intergenerational consequences of paternal incarceration by children's risk of exposure to paternal incarceration, studies have considered other types of heterogeneity.<sup>1</sup> For example, research has documented that paternal incarceration is more strongly associated with aggressive behaviors (Geller et al. 2012), physically aggressive behaviors (Wildeman 2010), and noncognitive readiness (Haskins 2014) for boys compared with girls. Other research has found that the association between paternal incarceration and behavioral problems is similar for whites and blacks (Haskins 2014; Wakefield and Wildeman 2011; also see Murray et al. 2012b).

Additional research, moving beyond heterogeneity by race/ethnicity and gender, is instructive. For example, Geller et al. (2012) found that the relationship between paternal incarceration and children's behavioral problems is strongest among children residing with their fathers prior to incarceration. They also found some evidence that these associations are concentrated among children of fathers who did not engage in domestic violence prior to incarceration (also see Wakefield and Wildeman 2011; Wildeman 2010). Given that children of residential fathers and fathers who do not

<sup>1</sup> For qualitative research on heterogeneous consequences for family life more generally, see, especially Turanovic et al. (2012).

engage in domestic violence likely have a lower risk of experiencing paternal incarceration than their respective counterparts, these findings suggest that paternal incarceration may be most consequential among children with low risks of experiencing paternal incarceration.

Finally, Turney and Wildeman (2015) examined risk-based heterogeneity in the consequences of maternal incarceration and found that the relationship between maternal incarceration and children's well-being is strongest among children with a 0 % to 5 % chance of experiencing the event. Still, there are good reasons to investigate the heterogeneous consequences of paternal incarceration. Demographically, although maternal incarceration remains relatively rare, paternal incarceration has emerged as a normative life course event for many children (Wildeman 2009). The differential risks of experiencing maternal incarceration and paternal incarceration may differentially shape responses to the events—and, as a practical matter, the higher prevalence of exposure to paternal incarceration allows for more rigorous statistical tests. Theoretically, the processes through which paternal and maternal incarceration affects children's well-being are likely quite different. For example, children exposed to maternal incarceration are often placed in the care of extended family or the foster care system (Siegel 2011; Wildeman and Waldfogel 2014). Children exposed to paternal incarceration often remain living with their mothers but face a number of economic and relational challenges that stem from the removal of fathers from families, as described earlier.

### **Contributions of the Present Study**

Research has provided an important starting point for understanding the relationship between paternal incarceration and children's well-being. The current study extends this research in two ways. First, by positing competing theories of event stressors and chronic stressors, this study provides a rigorous assessment of heterogeneity in children's risk of experiencing paternal incarceration based on an array of demographic, socioeconomic, and behavioral factors that influence their risk of experiencing paternal incarceration. Second, this study considers the family process mechanisms that may explain children's heterogeneous responses to paternal incarceration. Taken together, the results suggest that the intergenerational consequences of paternal incarceration are more complicated than previous research has suggested.

### **Data, Measures, and Analytic Strategy**

#### **Data**

I use data from the Fragile Families and Child Wellbeing Study (FFCWB), which is a cohort study of 4,898 children born to mostly unmarried parents in 1998–1999, to estimate the heterogeneous associations between paternal incarceration and children's well-being. The FFCWB includes parents and children sampled from 20 U.S. cities, all with populations greater than 200,000 (Reichman et al. 2001). Because unmarried parents were oversampled, the families in the sample are relatively economically disadvantaged (McLanahan 2009).

Beginning in 1998, mothers and most fathers were interviewed in hospitals immediately following the birth of their child, and follow-up telephone interviews occurred when children were 1, 3, 5, and 9 years old. Children and children's primary caregivers (usually but not always a parent) were also interviewed at the nine-year survey. Baseline response rates were 86 % for mothers and 78 % for fathers. Completion rates for the one-, three-, five-, and nine-year interviews were 90 %, 88 %, 87 %, and 76 % for mothers and 74 %, 72 %, 70 %, and 59 % for fathers, respectively. The response rates for fathers are comparatively lower than those for mothers, but in many cases, information about fathers is available from mothers. Additionally, the response rates are comparable to or higher than response rates of other household-based surveys, such as the National Survey of Family Growth (NSFG) (Sassler and McNally 2003).

To construct the analytic sample, I delete 1,539 observations missing a primary caregiver or child interview at the nine-year survey, which is when the outcome variables are measured. I then delete 207 observations missing any of the six dependent variables and an additional 87 observations in which the father is deceased. The final analytic sample comprises 3,065 children (see Table 1 for descriptive statistics of all variables included in the analyses). Some statistically significant observed differences exist between the full and analytic samples (see Online Resource 1, Table S1). Because attrition could lead to either underestimates or overestimates of the relationship between paternal incarceration and children's well-being, I conducted supplemental analyses that imputed all missing data in the baseline sample, including the dependent variables. Analyses that use this full imputed sample come to similar conclusions about the average and heterogeneous effects of paternal incarceration on children's well-being as those presented in this article.

The covariates—with the exceptions of mother's reports of relationship quality, mother's parenting stress, and some characteristics of fathers—are missing fewer than 10 % of observations (Online Resource 1, Table S2). Approximately 30 % of observations are missing at least one variable; therefore, I preserve missing covariates by producing 30 imputed data sets with the chained equations method in Stata MI commands (Allison 2001; Bodner 2008; Graham et al. 2007; White et al. 2011). All covariates, including the dependent variables, are included in the imputation equation, but observations missing any of the six dependent variables are dropped from the analytic sample (as described earlier).

## Measures

### *Dependent Variables*

The dependent variables include three indicators of children's problem behaviors and three indicators of children's cognitive skills, all measured at age 9. Children's internalizing behaviors and externalizing behaviors are measured with the Child Behavior Checklist (CBCL). Children's primary caregivers, nearly always their mothers, were asked to rate various aspects of the children's behaviors (0 = not true to 2 = very or often true). I average caregivers' responses to 32 questions about internalizing behaviors ( $\alpha = .88$ ) and 34 questions about externalizing

**Table 1** Descriptive statistics of variables used in analyses

Variable	Mean	SD
Children's Well-being		
Internalizing behaviors	0.000	1.000
Externalizing behaviors	0.000	1.000
Early juvenile delinquency	0.000	1.000
Reading comprehension	0.000	1.000
Math comprehension	0.000	1.000
Verbal ability	0.000	1.000
Key Independent Variable		
Paternal incarceration	0.310	
Mother Characteristics		
Race (b)		
Non-Hispanic white	0.208	
Non-Hispanic black	0.498	
Hispanic	0.261	
Non-Hispanic other race	0.033	
Foreign-born (b)	0.137	
Age at first birth (y1)	21.403	5.144
Lived with both biological parents at age 15 (b)	0.412	
Education (y1)		
Less than high school	0.304	
High school diploma or GED	0.283	
Postsecondary education	0.413	
Lives in public housing (y1)	0.142	
Receives welfare (y1)	0.260	
Neighborhood disadvantage index (y1)	0.047	3.471
Lives with parent (y1)	0.194	
Number of children in household (y1)	2.313	1.323
Multipartnered fertility (y1)	0.376	
In poverty (y1)	0.430	
Material hardship (y1)	1.171	1.627
Employed (y1)	0.548	
Relationship to child's father (y1)		
Married	0.275	
Cohabiting	0.265	
Nonresidential romantic	0.115	
No romantic relationship	0.345	
Relationship quality with child's father (y1)	3.158	1.430
Engagement with focal child (y1)	4.828	1.526
Parenting stress (y1)	2.224	0.683
Fair or poor health (y1)	0.134	
Depression (y1)	0.155	



**Table 1** (continued)

Variable	Mean	SD
Substance use (y1)	0.089	
Impulsivity (y5)	1.521	0.482
Cognitive ability (y3)	6.769	2.663
Incarcerated since baseline (y1)	0.008	
Father Characteristics		
Foreign-born (b)	0.154	
Education (y1)		
Less than high school	0.300	
High school diploma or GED	0.372	
Postsecondary education	0.328	
Multipartnered fertility (y1)	0.405	
Shared responsibility in parenting (y1)	2.799	1.103
Cooperation in parenting (y1)	3.311	0.925
Engagement with focal child (y1)	3.333	0.925
Parenting stress (y1)	2.089	0.681
Engaged in domestic violence (y1)	0.048	
Substance abuse problem (b, y1)	0.132	
Impulsivity (y1)	2.026	0.681
Cognitive ability (y3)	6.491	2.736
Previously incarcerated (b, y1)	0.326	
Child Characteristics		
Male (b)	0.520	
Age (months) (y9)	112.461	4.345
Born low birth weight (b)	0.094	
Fair or poor health (y1)	0.029	
<i>N</i>	3,065	

*Notes:* b = measured at the baseline survey; y1 = measured at the one-year survey; y3 = measured at the three-year survey; y5 = measured at the five-year survey; y9 = measured at the nine-year survey.

*Source:* Fragile Families and Child Wellbeing Study.

behaviors ( $\alpha = .91$ ). Children's early juvenile delinquency is measured with the "Things that You Have Done" scale (Maumary-Gremaud 2000; also see Elliott et al. 1989). I sum children's binary reports about participation in 17 delinquent activities ( $\alpha = .70$ ).

Additionally, children's cognitive skills are measured by reading comprehension, math comprehension, and verbal ability. Reading comprehension is measured with the Passage Comprehension subtest of the Woodcock-Johnson III Tests of Achievement. Math comprehension is measured with the Applied Problems subtest of the Woodcock-Johnson III Tests of Achievement. Both Woodcock-Johnson tests are normed by age and increase in complexity as they advance (mean = 100, SD = 15) (Woodcock et al. 2001). Finally, verbal ability is measured with the Peabody Picture Vocabulary Test-Third Edition (PPVT),

which is highly correlated with standardized measures of intelligence such as the Wechsler Intelligence Scale-Third Edition (Dunn and Dunn 1997).<sup>2</sup>

To facilitate comparisons across outcome variables, all variables are standardized (mean = 0, SD = 1), with higher scores indicating greater behavioral problems and more favorable cognitive skills.

### *Independent Variables*

The key independent variable is a binary variable indicating whether the child experienced any paternal incarceration between the one- and nine-year surveys. There are several opportunities to identify paternal incarceration at each wave, and children are considered to experience paternal incarceration if mothers' or fathers' direct and indirect reports of paternal incarceration are affirmative. Direct reports primarily include mothers' (at the three-, five-, and nine-year surveys) and fathers' (at the nine-year survey) reports that the father experienced incarceration since the previous survey wave.<sup>3</sup> Direct reports also include mothers' or fathers' reports—at the three-, five-, or nine-year surveys—that the father is incarcerated. Indirect reports include other reports of incarceration that emerged during the surveys (e.g., the parents' romantic relationship ended because the father was incarcerated). Whenever possible, I use information from both mothers and fathers, and given the underreporting of incarceration (Groves 2004), consider the father to experience incarceration if either report is affirmative. This approach, as well as the reliance on both direct and indirect reports of incarceration, is consistent with other research using these data (see, especially, Geller et al. 2016). Approximately 31 % of children experienced any paternal incarceration between the one- and nine-year surveys.

### *Additional Covariates*

The propensity score analyses match children on 50 observed maternal, paternal, and child characteristics, all of which were carefully chosen because of their association with the treatment or outcomes (e.g., Gottfredson and Hirschi 1990; Wakefield and Uggen 2010; Western 2006). These variables include demographic (e.g., race/ethnicity), socioeconomic (e.g., education), and familial (e.g., relationship status) characteristics, as well as several behavioral characteristics of fathers that are especially associated with selection into incarceration (e.g., impulsive behaviors and prior incarceration, which includes incarceration prior to baseline). Importantly, with the exception of several measures that are considered stable characteristics (e.g., impulsivity and cognitive ability), all characteristics are measured at the baseline or one-year surveys and, thus, prior to the independent variable. See Table S3 in Online Resource 1 for a complete description of all covariates.

<sup>2</sup> I bottom-coded the fewer than 1 % of observations with outlier values for cognitive outcomes.

<sup>3</sup> At the nine-year survey, mothers were asked whether the father had experienced incarceration in the past six years, and fathers were asked about the date of their most recent incarceration.

## Analytic Strategy

Given the concentration of paternal incarceration among some of the most vulnerable children, research investigating the intergenerational consequences of incarceration must consider selection into paternal incarceration (Wakefield and Wildeman 2013). Given the infeasibility and impracticality of randomly assigning fathers to incarceration, I instead employ propensity score matching—an approach for analyzing observational data with nonequivalent groups—to estimate the average and heterogeneous intergenerational consequences of paternal incarceration (Morgan and Winship 2007; Shadish et al. 2002). Although not without disadvantages (e.g., Shadish 2013), propensity score matching is an especially useful analytic strategy when there is substantial variation in exposure to the treatment: in this case, paternal incarceration. Propensity score matching is also an especially useful analytic strategy because it allows for an estimation of effect heterogeneity—the key theoretical contribution of this manuscript—in the counterfactual framework.

In the first analytic stage, I use propensity score matching to estimate the average association between paternal incarceration and children's well-being. First, a logistic regression model generates a propensity score—the probability of experiencing paternal incarceration—for each observation as a function of the covariates (Online Resource 1, Table S4). The goal is to ensure that the covariates included in the logistic regression model explain a relatively large proportion of the variance in the treatment, which necessitates including variables associated with the treatment into the equation (Caliendo and Kopeinig 2008; Morgan and Winship 2007). Second, I restrict the analyses to regions of common support and ensure the averages of the covariates are statistically indistinguishable across the treatment and control groups (Online Resource 1, Table S5). I use kernel matching, which matches all treatment observations to control observations by weighting control observations by their distance from treatment observations (kernel = Epanechnikov; bandwidth = 0.06). Third, I then use ordinary least squares (OLS) regression models, averaged across 30 data sets, to estimate children's well-being as a function of the treatment.

In the second analytic stage, I estimate the heterogeneous relationship between paternal incarceration and children's well-being (Xie et al. 2012; for an excellent example, see Brand and Xie 2010; also see Turney 2015). This approach considers how the consequences of paternal incarceration vary by the observed propensity for paternal incarceration. I use propensity scores to group observations into three strata ( $p = [.00-.20)$ ,  $p = [.20 = .40)$ ,  $p = [.40-.80)$ ). These three strata allow for comparable numbers of observations in each stratum and natural cutpoints of the propensity scores (Xie et al. 2012; also see Rosenbaum and Rubin 1984). Children in Strata 1, 2, and 3 have a low, moderate, and high risk of experiencing paternal incarceration, respectively.

Estimating heterogeneous treatment effect models involves balancing within strata. Therefore, within each stratum, the treatment and control groups have a similar distribution of covariates and vary only by paternal incarceration, with the analyses restricted to regions of common support. The process for achieving balance in the heterogeneous treatment effect models is similar to the process

for achieving balance in the average effect models. I attempted to include all covariates in the matching equation, but some covariates had to be excluded from these models to achieve balance. In some cases, I had to replace a variable with a related variable with less variation to achieve within-stratum balance. For example, I replaced the continuous measure of fathers' impulsivity, which would not balance across the treatment and control groups, with a dummy variable indicating high impulsivity (1 = impulsivity in the top quartile, 0 = impulsivity not in the top quartile). Detailed information about these variables, along with descriptive statistics by within-stratum treatment and control group, can be found in Online Resource 1, Table S6. Given that the covariates most strongly correlated with incarceration (e.g., relationship status, impulsivity, and prior incarceration) are all included in the matching equation and that the covariates are balanced across stratum, it seems unlikely the exclusion of some variables unduly biases the results.<sup>4</sup> Importantly, these analyses proceed under assumptions of ignorability, but similar to all analyses with observational data, selection biases may exist (for an exceptionally relevant discussion of selection, see Breen et al. 2015).

These multilevel models have two components. Level 1 uses kernel matching to estimate stratum-specific associations between paternal incarceration and children's well-being. Level 2, a variance-weighted least squares regression, estimates the trend in the variation of associations across propensity score strata (essentially estimating whether the between-stratum differences are statistically significant). A positive, significant Level 2 slope means that for each unit change in strata, there is an increase in the effect of paternal incarceration on the dependent variable (and a negative, significant coefficient indicates a decrease in the association). I conduct these multilevel analyses with Stata-compatible software by Jann et al. (2007). It is not possible to achieve balance across each of the 30 data sets with the same set of covariates; instead, within each of the 30 data sets, there are often one or two variables that will not balance across treatment and control groups. I do not average results across the 30 data sets given the importance of balancing in propensity score matching. Therefore, although using a single imputed data set may inflate standard errors, these analyses use the first imputed data set. In Table S7 in Online Resource 1, I compare estimates of the analyses presented to estimates from three additional sets of analyses: (1) those that use a different imputed data set, (2) those that use mean imputation, and (3) those that average results across all 30 data sets that use a consistent set of matching variables (even though some of those data sets include imbalanced treatment and control groups). The results are consistent across each of these analytic strategies.

<sup>4</sup> The estimates of the average effects match on prior maternal incarceration, measured as any incarceration between the baseline and one-year surveys (given that no information about maternal incarceration before baseline is available). The estimates of the heterogeneous effects do not match on this variable because very few mothers in the analytic sample ( $N = 26$ ) experienced prior maternal incarceration, making it impossible to achieve balance on this variable across treatment and control groups in each stratum. The analyses do control for this variable, though.

## Results

### Average Relationship Between Paternal Incarceration and Children's Well-being

Table 2 presents estimates of the average association between paternal incarceration and the six indicators of children's well-being, averaged across all imputed data sets. The unmatched estimates, reported in standard deviation units and displayed in the first column, show that paternal incarceration is associated with more problem behaviors and lower cognitive skills. Children of incarcerated fathers have higher internalizing behaviors ( $b = 0.170, p < .001$ ), externalizing behaviors ( $b = 0.377, p < .001$ ), and early juvenile delinquency ( $b = 0.290, p < .001$ ) than their counterparts without incarcerated fathers. Children of incarcerated fathers also have lower test scores ( $b = -0.251, p < .001$  for reading comprehension;  $b = -0.295, p < .001$  for math comprehension; and  $b = -0.311, p < .001$  for verbal ability).

The matched estimates—those that compare the treatment and control groups after matching on propensity scores—are displayed in the second column. Paternal incarceration remains statistically significantly associated with children's problem behaviors. Paternal incarceration is associated with more internalizing behaviors ( $b = 0.135, p < .01$ ), externalizing behaviors ( $b = 0.205, p < .001$ ), and early juvenile delinquency ( $b = 0.126, p < .05$ ). However, these matched estimates show that the relationship between paternal incarceration and children's cognitive skills is small and statistically nonsignificant. On average, children who do and do not experience paternal incarceration have similar reading comprehension ( $b = -0.065, n.s.$ ), math comprehension ( $b = -0.048, n.s.$ ), and verbal ability scores ( $b = -0.059, n.s.$ ).

**Table 2** Propensity score matching estimates of the average relationship between paternal incarceration and children's well-being

Variable	Unmatched		Matched	
	<i>b</i>	SE	<i>b</i>	SE
<b>Children's Well-being</b>				
Internalizing behaviors	0.170***	.039	0.135**	.049
Externalizing behaviors	0.377***	.038	0.205***	.053
Early juvenile delinquency	0.290***	.039	0.126*	.050
Reading comprehension	-0.251***	.039	-0.065	.045
Math comprehension	-0.295***	.039	-0.048	.044
Verbal ability	-0.311***	.039	-0.059	.040
Treatment <i>N</i>	949		937–949	
Control <i>N</i>	2,116		2,116	

*Notes:* All dependent variables are standardized (mean = 0, standard deviation = 1). Propensity scores are estimated with a logistic regression model estimating paternal incarceration (between the one- and nine-year surveys) as a function of pre-incarceration covariates in Table 1. Matched estimates are based on kernel matching. Treatment *N*s vary across the 30 multiply imputed data sets.

*Source:* Fragile Families and Child Wellbeing Study.

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$  (two-tailed tests)

## Heterogeneous Relationship Between Paternal Incarceration and Children's Well-being

### *Descriptive Statistics by Risk of Experiencing Paternal Incarceration*

I next consider the possibility that the average associations mask heterogeneity across children's risk for experiencing paternal incarceration. Recall that children are placed into three groups based on their risk of, or propensity for, experiencing paternal incarceration (relative to others in the sample). Children in Stratum 1 have a low risk of exposure, children in Stratum 2 have a moderate risk of exposure, and children in Stratum 3 have a high risk of exposure. Before considering the heterogeneous consequences of paternal incarceration, it is important to carefully examine the demographic, socioeconomic, and behavioral characteristics of the three groups of children prior to paternal incarceration. Table 3 displays the means for all covariates across the three propensity score strata (and the statistically significant differences between stratum).

Children in Stratum 1 (those with a relatively low risk of experiencing paternal incarceration) are more advantaged than their counterparts in Stratum 2 or Stratum 3 across nearly all demographic, socioeconomic, and behavioral characteristics considered. In terms of demographic characteristics, approximately 35 % of children in Stratum 1 have mothers who identify as non-Hispanic white, compared with 17 % of children in Stratum 2 and 11 % of children in Stratum 3. Mothers in Stratum 1 have higher ages at first birth and are more likely to report living with both biological parents at age 15. Mothers in Stratum 1 are also more likely to be married to the child's biological father at the one-year survey and report higher overall relationship quality with the father.

In terms of socioeconomic characteristics prior to exposure to paternal incarceration, children in Stratum 1 are the most advantaged. For example, approximately 67 % of children in Stratum 1 have mothers with postsecondary education (compared with 39 % and 17 % in Strata 2 and 3, respectively) and 64 % of children in Stratum 1 have fathers with postsecondary education (compared with 26 % and 7 % in Strata 2 and 3, respectively). Children in Stratum 1 are less likely to be living in poverty, to be living in public housing, and to have mothers who received welfare in the past year. Neighborhood disadvantage also varies significantly across strata.

In sum, nearly across all covariates, the means between Strata 1 and 2 are statistically different, and the means between Strata 2 and 3 are statistically different. Furthermore, these descriptive statistics suggest that prior to paternal incarceration, children in Stratum 1 (those with the lowest risks of experiencing paternal incarceration) have the most advantaged family lives as measured by a set of demographic, socioeconomic, and behavioral covariates measured at the baseline or one-year surveys. Children in Stratum 3 (those with the highest risks of experiencing paternal incarceration) have the most disadvantaged family lives. However, when considering differences across strata, it is important to keep in mind the relatively disadvantaged nature of the FFCWB sample. Children in Stratum 1, who are certainly more advantaged across an array of domains than their counterparts in Stratum 2 or Stratum 3, are not an exceptionally advantaged (or low-risk) group. For example, approximately 21 % of children in Stratum 1 are living in households with incomes below the poverty line,

**Table 3** Means of covariates, by propensity score strata

Variable	Stratum 1 <i>p</i> = [0–.20)	Stratum 2 <i>p</i> = [.20–.40)	Stratum 3 <i>p</i> = [.40–.80)
<b>Mother Characteristics</b>			
Race			
Non-Hispanic white	0.350 <sup>a,b</sup>	0.165 <sup>b,c</sup>	0.107 <sup>a,c</sup>
Non-Hispanic black	0.205 <sup>a,b</sup>	0.576 <sup>b,c</sup>	0.720 <sup>a,c</sup>
Hispanic	0.382 <sup>a,b</sup>	0.234 <sup>b,c</sup>	0.162 <sup>a,c</sup>
Non-Hispanic other race	0.063 <sup>a,b</sup>	0.025 <sup>b,c</sup>	0.011 <sup>a,c</sup>
Foreign-born	0.375 <sup>a,b</sup>	0.034 <sup>b,c</sup>	0.001 <sup>a,c</sup>
Age at first birth	24.704 <sup>a,b</sup>	20.378 <sup>b,c</sup>	19.151 <sup>a,c</sup>
Lived with both biological parents at age 15	0.659 <sup>a,b</sup>	0.356 <sup>b,c</sup>	0.217 <sup>a,c</sup>
Education			
Less than high school	0.188 <sup>a,b</sup>	0.272 <sup>b,c</sup>	0.465 <sup>a,c</sup>
High school diploma or GED	0.147 <sup>a,b</sup>	0.337 <sup>c</sup>	0.365 <sup>c</sup>
Postsecondary education	0.665 <sup>a,b</sup>	0.391 <sup>b,c</sup>	0.170 <sup>a,c</sup>
Lives in public housing	0.062 <sup>a,b</sup>	0.139 <sup>b,c</sup>	0.235 <sup>a,c</sup>
Receives welfare	0.067 <sup>a,b</sup>	0.243 <sup>b,c</sup>	0.485 <sup>a,c</sup>
Neighborhood disadvantage index	-1.516 <sup>a,b</sup>	0.422 <sup>b,c</sup>	1.256 <sup>a,c</sup>
Lives with parent	0.084 <sup>a,b</sup>	0.187 <sup>b,c</sup>	0.317 <sup>a,c</sup>
Number of children in household	2.018 <sup>a,b</sup>	2.382 <sup>b,c</sup>	2.536 <sup>a,c</sup>
Multipartnered fertility	0.234 <sup>a,b</sup>	0.437 <sup>c</sup>	0.457 <sup>c</sup>
In poverty	0.205 <sup>a,b</sup>	0.388 <sup>b,c</sup>	0.710 <sup>a,c</sup>
Material hardship	0.795 <sup>a,b</sup>	1.252 <sup>b,c</sup>	1.444 <sup>a,c</sup>
Employed	0.601 <sup>b</sup>	0.578 <sup>b</sup>	0.465 <sup>a,c</sup>
Relationship to child's father			
Married	0.583 <sup>a,b</sup>	0.192 <sup>b,c</sup>	0.040 <sup>a,c</sup>
Cohabiting	0.274 <sup>a,b</sup>	0.341 <sup>b,c</sup>	0.174 <sup>a,c</sup>
Nonresidential romantic	0.027 <sup>a,b</sup>	0.132 <sup>b,c</sup>	0.183 <sup>a,c</sup>
No romantic relationship	0.116 <sup>a,b</sup>	0.335 <sup>b,c</sup>	0.603 <sup>a,c</sup>
Relationship quality with child's father	3.750 <sup>a,b</sup>	3.171 <sup>b,c</sup>	2.545 <sup>a,c</sup>
Engagement with focal child	4.749 <sup>a</sup>	4.893 <sup>c</sup>	4.827
Parenting stress	2.173 <sup>b</sup>	2.180 <sup>b</sup>	2.322 <sup>a,c</sup>
Fair or poor health	0.102 <sup>b</sup>	0.121 <sup>b</sup>	0.180 <sup>a,c</sup>
Depression	0.115 <sup>a,b</sup>	0.146 <sup>b,c</sup>	0.215 <sup>a,c</sup>
Substance use	0.061 <sup>a,b</sup>	0.089 <sup>b,c</sup>	0.121 <sup>a,c</sup>
Impulsivity	1.452 <sup>a,b</sup>	1.523 <sup>b,c</sup>	1.599 <sup>a,c</sup>
Cognitive ability	7.255 <sup>a,b</sup>	6.803 <sup>b,c</sup>	6.216 <sup>a,c</sup>
Incarcerated since baseline	0.005 <sup>b</sup>	0.006 <sup>b</sup>	0.017 <sup>a,c</sup>
<b>Father Characteristics</b>			
Foreign-born	0.330 <sup>a,b</sup>	0.082 <sup>b,c</sup>	0.048 <sup>a,c</sup>
Education			
Less than high school	0.194 <sup>a,b</sup>	0.280 <sup>b,c</sup>	0.439 <sup>a,c</sup>

**Table 3** (continued)

Variable	Stratum 1 $p = [0-.20)$	Stratum 2 $p = [.20-.40)$	Stratum 3 $p = [.40-.80)$
High school diploma or GED	0.163 <sup>a,b</sup>	0.460 <sup>c</sup>	0.492 <sup>c</sup>
Postsecondary education	0.643 <sup>a,b</sup>	0.260 <sup>b,c</sup>	0.069 <sup>a,c</sup>
Multipartnered fertility	0.213 <sup>a,b</sup>	0.442 <sup>b,c</sup>	0.560 <sup>a,c</sup>
Shared responsibility in parenting	3.230 <sup>a,b</sup>	2.884 <sup>b,c</sup>	2.278 <sup>a,c</sup>
Cooperation in parenting	3.588 <sup>a,b</sup>	3.350 <sup>b,c</sup>	2.973 <sup>a,c</sup>
Engagement with focal child	3.894 <sup>a,b</sup>	3.559 <sup>b,c</sup>	2.433 <sup>a,c</sup>
Parenting stress	2.022 <sup>b</sup>	2.026 <sup>b</sup>	2.239 <sup>a,c</sup>
Engaged in domestic violence	0.027 <sup>a,b</sup>	0.038 <sup>b,c</sup>	0.088 <sup>a,c</sup>
Substance abuse problem	0.055 <sup>a,b</sup>	0.097 <sup>b,c</sup>	0.251 <sup>a,c</sup>
Impulsivity	1.826 <sup>a,b</sup>	1.916 <sup>b,c</sup>	2.347 <sup>a,c</sup>
Cognitive ability	6.803 <sup>a,b</sup>	6.420 <sup>c</sup>	6.242 <sup>c</sup>
Previously incarcerated	0.048 <sup>a,b</sup>	0.232 <sup>b,c</sup>	0.724 <sup>a,c</sup>
<b>Child Characteristics</b>			
Male	0.518	0.499 <sup>b</sup>	0.547 <sup>a</sup>
Age	112.517	112.370	112.527
Born low birth weight	0.056 <sup>a,b</sup>	0.104 <sup>c</sup>	0.126 <sup>c</sup>
Fair or poor health	0.027	0.027	0.034
<i>N</i>	1,019	1,079	967

*Notes:* Children in Stratum 1 have a low risk for experiencing paternal incarceration, children in Stratum 2 have a moderate risk, and children in Stratum 3 have a high risk.

*Source:* Fragile Families and Child Wellbeing Study.

<sup>a</sup> Significantly different from Stratum 2 ( $p < .05$ ).

<sup>b</sup> Significantly different from Stratum 3 ( $p < .05$ ).

<sup>c</sup> Significantly different from Stratum 1 ( $p < .05$ ).

which is just slightly below the average national childhood poverty rate of 22 % (Wight et al. 2010). I return to the implications of this later.

### *Estimating the Heterogeneous Associations*

In Table 4, I estimate the heterogeneous relationships between paternal incarceration and children's problem behaviors and cognitive skills. I turn first to the matched estimates of children's problem behaviors. The Level 1 coefficients show that in Stratum 1 (children with a relatively low risk of experiencing paternal incarceration), children with incarcerated fathers have internalizing behaviors that are nearly one-third of a standard deviation higher than their counterparts without incarcerated fathers ( $b = 0.313$ ,  $p < .001$ ). A positive association also exists in Stratum 2, although the coefficient is smaller in magnitude ( $b = 0.146$ ,  $p < .05$ ). In Stratum 3, the coefficient is statistically nonsignificant ( $b = 0.093$ , n.s.). The Level 2 slope demonstrates that for each unit change in strata, there is a 0.104 standard deviation decrease in the paternal incarceration coefficient ( $p < .10$ ). Therefore, the deleterious consequences of paternal



**Table 4** Propensity score matching estimates of the heterogeneous relationship between paternal incarceration and children's well-being

Variable	Level 1						Level 2	
	Stratum 1 $p = [0-.20)$		Stratum 2 $p = [.20-.40)$		Stratum 3 $p = [.40-.80)$		Trend	
	<i>b</i>	SE	<i>b</i>	SE	<i>b</i>	SE	<i>b</i>	SE
<b>Children's Well-being</b>								
Internalizing behaviors	.313***	.088	.146*	.068	.093	.068	-.104 <sup>†</sup>	.055
Externalizing behaviors	.407***	.067	.328***	.067	.170*	.070	-.120*	.053
Early juvenile delinquency	.105	.084	.151*	.062	.202**	.074	.049	.056
Reading comprehension	-.298**	.096	-.125*	.061	-.047	.067	.118*	.057
Math comprehension	-.325**	.096	-.073	.063	-.045	.062	.119*	.055
Verbal ability	-.315**	.110	-.089	.059	-.065	.054	.093 <sup>†</sup>	.055
Treatment <i>N</i>	113		341		492			
Control <i>N</i>	905		738		473			

*Notes:* All dependent variables are standardized (mean = 0, standard deviation = 1). Propensity scores are estimated with a logistic regression model estimating paternal incarceration (between the one- and nine-year surveys) as a function of pre-incarceration covariates in Online Resource 1, Table S6. Estimates also control for prior maternal incarceration (an especially relevant variable that would not achieve balance across treatment and control groups). Children in Stratum 1 have the lowest risk for experiencing paternal incarceration. Children in Stratum 3 have the highest risk for experiencing paternal incarceration. Results are based on kernel matching. Results are presented for first imputed data set.

*Source:* Fragile Families and Child Wellbeing Study.

<sup>†</sup> $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$  (two-tailed tests)

incarceration for internalizing behaviors are strongest for children with relatively low risks for experiencing paternal incarceration.

The matched estimates of externalizing behaviors produce similar results. Paternal incarceration is associated with two-fifths of a standard deviation increase in externalizing behaviors in Stratum 1 ( $b = 0.407$ ,  $p < .001$ ), one-third of a standard deviation increase in Stratum 2 ( $b = 0.328$ ,  $p < .001$ ), and one-sixth of a standard deviation increase in Stratum 3 ( $b = 0.170$ ,  $p < .05$ ). The Level 2 slope shows that there is a 0.120 standard deviation decrease in the paternal incarceration coefficient across each unit change in strata ( $p < .05$ ). Taken together, the estimates show that paternal incarceration is negatively associated with children's externalizing behaviors, regardless of their risk for experiencing paternal incarceration, but that the association is strongest among children with low risk for experiencing paternal incarceration.

The matched estimates of early juvenile delinquency show the association between paternal incarceration and early juvenile delinquency is similar across children with low, moderate, and high risks of experiencing paternal incarceration. Among children in the low-risk group, those who experience paternal incarceration (compared with their counterparts who do not experience paternal incarceration) report more early juvenile delinquency ( $b = 0.105$ , n.s.). The associations are positive and statistically significant across the other two groups (for children in the moderate-risk group,  $b = 0.151$ ,  $p < .05$ ;

for children in the high-risk group,  $b = 0.202$ ,  $p < .01$ ), and the Level 2 slope shows no statistically significant differences across the groups ( $b = 0.049$ , n.s.).

I turn next to the matched estimates of cognitive skills. Across all three outcomes, children in Stratum 1 suffer deleterious consequences of paternal incarceration. In Stratum 1, children who experience paternal incarceration (compared with those who do not) have lower reading comprehension skills ( $b = -0.298$ ,  $p < .01$ ), lower math comprehension skills ( $b = -0.325$ ,  $p < .01$ ), and lower verbal ability scores ( $b = -0.315$ ,  $p < .01$ ). Among children in Stratum 2, there is an association between paternal incarceration and reading comprehension scores ( $b = -0.125$ ,  $p < .05$ ) but no association between paternal incarceration and math comprehension or verbal ability scores. And, in Stratum 3, none of the associations between paternal incarceration and cognitive skills are statistically significant. The Level 2 slopes, which consider the between-strata differences, are statistically significant for estimates of reading and math comprehension and marginally statistically significant for estimates of verbal ability. These results, especially in light of the null average association between paternal incarceration and children's cognitive skills, highlight the importance of considering variation across children's risk.

Although the Level 2 slopes are statistically significant for five of the six outcomes, which is noteworthy given that these estimates are generated from only three data points (e.g., Schafer et al. 2013), it is also possible to compare the differences between the adjacent strata (Paternoster et al. 1998). Doing this shows statistically significant differences between Stratum 1 and Stratum 2 in estimates of math comprehension ( $z = -2.312$ ); between Stratum 2 and Stratum 3 in estimates of externalizing behaviors ( $z = -2.446$ ) and early juvenile delinquency ( $z = -2.735$ ); and between Stratum 1 and Stratum 3 in estimates of internalizing problems ( $z = 1.978$ ), externalizing problems ( $z = 2.446$ ), reading comprehension ( $z = -2.144$ ), math comprehension ( $z = -2.450$ ), and verbal ability ( $z = -2.040$ ).

### *Strengthening Causal Inference*

The propensity score framework matches individuals only on observable characteristics; accordingly, it is possible that the observed patterns result from unobserved selection into incarceration. I further strengthen causal inference with three sets of supplemental analyses: (1) analyses that adjust for a lagged dependent variable; (2) analyses that consider first-time paternal incarceration; and (3) Rosenbaum sensitivity analyses.

First, I estimate the results by adjusting for a lagged dependent variable, which isolates the association between paternal incarceration and children's well-being net of prior well-being (essentially accounting for time-invariant characteristics associated with both prior and current well-being, which is a more rigorous test of the association than previously presented).<sup>5</sup> This approach necessitates considering paternal incarceration between the three- and nine-year surveys, instead of between the one- and nine-year surveys, because children's problem behaviors and cognitive skills are first measured at the three-year survey (and, thus, prior to this auxiliary measure

<sup>5</sup> The estimates of internalizing and externalizing behaviors adjust for internalizing and externalizing behaviors, respectively, at the three-year survey. The estimates of early juvenile delinquency adjust for externalizing behaviors at the three-year survey (given that no earlier measure of delinquency is available). The estimates of reading comprehension, math comprehension, and verbal ability adjust for verbal ability at the three-year survey (because that is the only measure of cognitive skills measured during that survey wave).

of paternal incarceration). The results are similar to those presented in Table 4. First, with the exception of estimates for early juvenile delinquency, the deleterious consequences of paternal incarceration are largest in magnitude among children in Stratum 1 (those with a relatively low risk of experiencing paternal incarceration). Second, the between-stratum differences are statistically significant for all outcomes except early juvenile delinquency.

Second, I consider the relationship among first-time paternal incarceration between the one- and nine-year surveys and children's well-being. Considering first-time paternal incarceration strengthens causal inference because it ensures that the covariates are exogenous to any incarceration experience. This treatment variable is in contrast to the one used in previous analyses, which includes fathers who experienced both first- and higher-order incarcerations between the one- and nine-year surveys. Considering first-time incarceration provides a more stringent test of the relationship, but the smaller number of individuals who experienced first-time incarceration necessitates two strata instead of three: Stratum 1 ( $p = [.00-.20]$ ) and Stratum 2 ( $p = [.20 = .45]$ ). The results are similar to those presented in Table 4, with the between-strata differences reaching statistical significance for five of the six outcome variables.

Third, I estimate Rosenbaum sensitivity analyses that document the amount of unobserved heterogeneity that would have to exist to render the observed relationships statistically nonsignificant (Rosenbaum 2002, 2010; also see Becker and Caliendo 2007). These sensitivity analyses may strengthen causal inference because it involves an assumption about the strength of the relationship between the potential confounder and the outcome. Given that Stratum 1 is the stratum that documents consistently significant and detrimental intergenerational consequences of paternal incarceration, I restrict these analyses to these observations ( $n = 1019$ ). These findings show that an unobserved confounder would have to increase the odds of being incarcerated by 60 % for internalizing behaviors, by 130 % for externalizing behaviors, by 70 % for reading comprehension, by 110 % for math comprehension, and by 100 % for verbal ability. Considering these percentages in comparison with the coefficients estimating paternal incarceration (Online Resource 1, Table S4) suggests that it is unlikely there is one observed variable—that remains uncorrelated with the covariates included in the matching equation—that would render these results statistically nonsignificant.

### **Mechanisms Linking Paternal Incarceration to Children's Well-being**

The preceding analyses document that the relationship between paternal incarceration and children's well-being is most consequential among children who have relatively low risks of experiencing paternal incarceration. In Table 5, I present auxiliary analyses that shed light on the mechanisms underlying this heterogeneity. I consider four sets of mechanisms suggested in the literature (and available in the data): (1) strain imposed on familial economic resources (measured by mother's poverty, material hardship, and employment); (2) dissolution and disruption of parental relationships (measured by mother's separation from the child's father, partnering with a new romantic partner, and relationship quality with the child's father); (3) impairment of parenting behaviors (measured by mother's engagement with the focal child, reports of father's shared responsibility in parenting, reports of father's cooperation in parenting, parenting stress, and neglect); and (4) weakening of maternal mental health (measured by fair or poor

**Table 5** Auxiliary analyses considering means of potential mechanisms, measured after paternal incarceration

Variable	Stratum 1			Stratum 2			Stratum 3		
	$p = [0-.20)$			$p = [.20-.40)$			$p = [.40-.80)$		
	Treatment	Control	Percentage Difference	Treatment	Control	Percentage Difference	Treatment	Control	Percentage Difference
<b>Mechanisms</b>									
Economic well-being									
In poverty	0.307	0.178	42**	0.496	0.355	28****	0.583	0.543	7
Material hardship	1.510	0.740	51****	1.666	1.248	25****	1.695	1.468	13*
Employed	0.693	0.686	1	0.622	0.642	3	0.540	0.562	4
<b>Relationship with father</b>									
No romantic relationship with focal child's father	0.684	0.248	64****	0.780	0.602	23****	0.872	0.738	15****
New romantic partner	0.351	0.145	59****	0.452	0.350	23****	0.538	0.410	24****
Relationship quality with child's father	2.491	3.615	45****	2.267	2.854	26****	2.065	2.374	15****
<b>Parenting</b>									
Engagement with focal child	2.672	2.614	2	2.785	2.729	2	2.799	2.751	2
Father's shared responsibility in parenting	1.993	3.003	51****	1.836	2.328	27****	1.578	1.888	20****
Father's cooperation in parenting	2.756	3.479	26****	2.517	3.009	20****	2.216	2.588	17****
Parenting stress	2.104	1.935	8*	2.061	2.004	3	2.167	2.145	1
Neglect	0.080	0.055	31†	0.071	0.052	27*	0.057	0.053	7
<b>Health</b>									
Fair or poor health	0.132	0.108	18	0.191	0.146	24†	0.239	0.222	7
Depression	0.219	0.107	51****	0.208	0.173	17	0.247	0.209	15
Substance use	0.158	0.077	51*	0.179	0.110	39**	0.200	0.167	17
N	114	905		341	738		494	473	

*Notes:* All potential mechanisms are measured at the nine-year survey. All variables refer to characteristics of mothers unless otherwise noted. *Source:* Fragile Families and Child Wellbeing Study.

†  $p < .10$ ; \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$  (two-tailed tests)

health, depression, and substance use). I present the means of all mechanisms (measured at the nine-year survey and, therefore, after paternal incarceration) across the treatment and control groups in Stratum 1, Stratum 2, and Stratum 3. Keep in mind that prior to the measure of paternal incarceration, these groups had nearly identical values on these mechanisms (see Online Resource 1, Table S4); therefore, under the assumption of ignorability, any differences between the treatment and control groups in these mechanisms result from incarceration.<sup>6</sup>

These auxiliary analyses suggest two main findings. First, across many of the mechanisms considered, statistically significant differences exist between the treatment and control groups in Stratum 1, Stratum 2, and Stratum 3. For example, consider the measures of economic well-being. Children exposed to paternal incarceration are more likely than their counterparts not exposed to paternal incarceration to experience poverty at the nine-year survey in Stratum 1, Stratum 2, and Stratum 3. Similarly, children exposed to paternal incarceration, compared with those not exposed to paternal incarceration, experience more material hardship at the nine-year survey in Stratum 1, Stratum 2, and Stratum 3. The measures of parental relationships, parenting, and mental health show similar patterns. For example, children exposed to paternal incarceration have mothers who report lower relationship quality at the nine-year survey in Stratum 1, Stratum 2, and Stratum 3.

Second, and perhaps most importantly, across nearly all mechanisms considered, the percentage difference between the treatment and control groups is largest among those observations in Stratum 1. For example, the percentage difference in poverty between the treatment and control groups is 42 % for those in Stratum 1, 28 % for those in Stratum 2, and 7 % for those in Stratum 3. The percentage difference in material hardship between the treatment and control groups is 51 % for those in Stratum 1, 25 % for those in Stratum 2, and 13 % for those in Stratum 3. These patterns are similar for measures of parental relationships, parenting, and health.

Therefore, although these analyses are not a formal test of mechanisms, the results provide suggestive evidence that children in Stratum 1 experience the greatest changes in their family lives after paternal incarceration, which may explain why the consequences of paternal incarceration are strongest for these children.

## Discussion

The rising, although recently stabilized, incarceration rates in the United States means that poor and minority children are especially vulnerable to experiencing paternal incarceration (Carson 2014; Wildeman 2009). Indeed, in response to this contemporary form of childhood vulnerability, researchers have increasingly investigated the unintended consequences of paternal incarceration for children, mostly documenting negative effects and suggesting that incarceration may exacerbate inequality among children (e.g., Wakefield and Wildeman 2013). However, there are good reasons to expect that the intergenerational consequences of paternal incarceration are unequally distributed. Theories about event and chronic stressors, as well as existing qualitative research (e.g., Braman 2004; Comfort 2008; Edin et al. 2004; Turanovic et al. 2012), suggest

<sup>6</sup> An exception is mothers' neglect because that was not measured at the one-year survey.

that some children may be more vulnerable to paternal incarceration than other children. Understanding these inequalities is vital for documenting the complex and countervailing ways that paternal incarceration contributes to or exacerbates childhood inequalities (Sampson 2011).

In this article, I use longitudinal data from the Fragile Families and Child Wellbeing Study (FFCWB) to examine the heterogeneous relationship between paternal incarceration and children's well-being at age 9. I begin by considering the average consequences of paternal incarceration. Descriptively, children who experienced paternal incarceration between ages 1 and 9 have more problem behaviors and fewer cognitive skills than their counterparts who did not experience paternal incarceration. The association between paternal incarceration and children's problem behaviors remains after matching children with and without incarcerated parents on observable characteristics, but the association between paternal incarceration and children's cognitive skills is small and statistically nonsignificant. The deleterious consequences for children's problem behaviors are consistent with other research examining children's behaviors in early (Geller et al. 2012; Wildeman 2010) and middle childhood (Haskins 2015; Johnson 2009; Wilbur et al. 2007). The null average associations on cognitive skills are consistent with the null average effects on test scores among younger children (Geller et al. 2012; Haskins 2014), but they are inconsistent with negative average effects on children's high school grade point averages (Foster and Hagan 2007) and other educational outcomes (Murray et al. 2012b). Together, these findings suggest that the average consequences of paternal incarceration for children's cognitive skills may increase as children progress through school (also see Turney and Haskins 2014), and future research should directly consider this possibility.

Additionally, and importantly, I extend existing research that primarily considers the average effects of paternal incarceration by considering heterogeneity by children's risks of experiencing paternal incarceration. These analyses suggest that heterogeneity exists in children's risks of experiencing paternal incarceration—based on the characteristics of their families—with statistically significant differences between children with relatively low (Stratum 1), moderate (Stratum 2), and high (Stratum 3) risks of experiencing paternal incarceration. Children in Stratum 1, compared with children in Stratum 2 and Stratum 3, are more advantaged in terms of the demographic, socioeconomic, and behavioral characteristics of their families. Children in Stratum 3 experience the most disadvantages.

Furthermore, and relatedly, I find that children's risks of experiencing paternal incarceration shape their responses to paternal incarceration for five of the six outcomes considered. Children with low risks of experiencing paternal incarceration (Stratum 1) experience greater deleterious consequences of paternal incarceration than their counterparts in Stratum 2 or Stratum 3. These effect sizes in Stratum 1, ranging from between one-fourth to two-fifths of a standard deviation, are moderate in magnitude and larger in magnitude than the average effects of paternal incarceration as documented here and in other research (e.g., Haskins 2014; for effect sizes discussed as odds ratios, see Murray et al. 2012a). They are also generally larger in magnitude than effect sizes of divorce (which range from .08 to .26; Amato 2001) or nonresident father involvement (which range from .02 to .14; Amato and Gilbreth 1999) on children's well-being. These heterogeneous findings suggest that considering the average effects of paternal incarceration masks considerable differences in the magnitude and statistical

significance of associations by risk. They also suggest that for some children, the association between paternal incarceration and children's well-being is stronger than shown in prior research.

For children in Stratum 3, who had a high risk of experiencing paternal incarceration, the magnitude of the association between paternal incarceration and children's well-being is smaller compared with the other two strata. Children in Stratum 3 exposed to paternal incarceration, compared with their counterparts in Stratum 3 not exposed to paternal incarceration, have statistically significantly greater externalizing behaviors and early juvenile delinquency (and do not have internalizing behaviors or test scores that are statistically significantly higher or lower). The differences across strata are statistically significant for five of the six outcomes considered. Importantly, paternal incarceration is equally consequential for early juvenile delinquency of children in all three strata, with the magnitude largest among children in Strata 3 (although differences between stratum are not statistically significant). Perhaps paternal incarceration has similar consequences for children's early juvenile delinquency regardless of their likelihood of experiencing paternal incarceration, or perhaps these differences result from the fact that early juvenile delinquency is reported by children instead of caregivers. These and other explanations should be further interrogated.

Why are the intergenerational consequences of paternal incarceration largest among children whose family lives put them at low risk of experiencing paternal incarceration? First, theories about social stressors—and, specifically, event stressors—provide some guidance (Eaton 1978; Wheaton 1982). Children unlikely to experience paternal incarceration have relatively advantaged family lives. For these children, paternal incarceration may be especially detrimental for family life. The effects of incarceration may be more dramatic and pronounced for these children because these families are likely to experience the biggest loss, to suffer the greatest changes in family routines, to be unprepared for the resultant hardship, and to be unable to mobilize social support networks. The auxiliary analyses—which suggest larger differences in economic well-being, parental relationships, parenting, and health by paternal incarceration status among those with the lowest risks of incarceration compared with those with the highest risks of incarceration—provide some evidence to support these ideas. These analyses, however, do not allow a precise disentanglement of whether paternal incarceration preceded changes in economic well-being, parental relationships, parenting, and health; accordingly, assumptions of sequential ignorability may not be met (Imai et al. 2010). A formal test of causal mechanisms is outside the scope of these analyses and should be pursued in other research.

Why are the consequences of paternal incarceration—with the exception of the consequences for early juvenile delinquency—smallest in magnitude for children with a high risk of experiencing paternal incarceration? These children experience many disadvantages, and for them, some of the descriptive differences by paternal incarceration are explained by these social factors that select them into experiencing paternal incarceration. For these children, paternal incarceration occurs amongst a saturation of additional disadvantages, and this constellation of disadvantage means that paternal incarceration has no additive consequences for children's internalizing behaviors and cognitive skills (although paternal incarceration has no positive effects on any outcomes for this group or any other). Also, results show consequences for children's

externalizing behaviors and early juvenile delinquency above and beyond this constellation of disadvantage, suggesting that these children—because of the accumulation of disadvantages and the added deleterious consequences of paternal incarceration—are an especially vulnerable group.

Aside from the multifaceted and complex disadvantages faced by these most vulnerable children, which may explain the mostly weaker associations for children in this group, additional potential explanations exist for these weaker associations. One explanation may be that children stop accumulating adverse consequences after they reach a certain point of saturation (Hannon 2003). A related explanation may be that incarceration offers relief from other stressors, such as domestic violence or economic deprivation (Wheaton 1990). Finally, perhaps the results are an artifact of ceiling or floor effects or that the positive and negative effects of incarceration offset one another, given that the heterogeneous treatment effects models do not consider within-stratum heterogeneity. One could envision a scenario in which incarceration simultaneously had negative effects on children's well-being because of its resultant severe economic deprivation but had positive effects on children's well-being because of its removal of a violent father from the household. Future research should rigorously interrogate these possibilities.

## Limitations

Perhaps most importantly, observed associations may result from unmeasured variables that could render the heterogeneous consequences of paternal incarceration statistically nonsignificant. I minimize this potential bias with a series of propensity score models that proceed under the ignorability assumption. Unobserved confounders may exist (see especially Breen et al. 2015), but two aspects of the methodological approach suggest that this is unlikely. First, the Rosenbaum bounds suggest that unobserved forces would have to be considerable. Second, the models estimating heterogeneous relationships show that the results are concentrated among children who are relatively unlikely to experience paternal incarceration. If negative selection into incarceration exists, it seems likely that the associations would be instead concentrated among children who are relatively likely to experience incarceration. Although it is still possible that the negative aspects of children's lives are more readily observable among more advantaged children (those unlikely to experience incarceration), it is these observable characteristics that are captured in the matching equation. Future research should strive to develop creative and rigorous analytic designs to isolate the heterogeneous causal effects of paternal incarceration (Travis et al. 2014).

Additionally, similar to nearly all research on the intergenerational consequences of paternal incarceration, the measures of paternal incarceration are limited. It is not possible to disentangle the complex incarceration experiences, and it is quite conceivable that different types of incarceration experiences (e.g., duration, location of facility) differentially affect families and children (and differentially at various points across the propensity score distribution). Further, paternal incarceration is measured during an eight-year time period; necessarily, when the outcome variables are measured, some children are further away from the experience of paternal incarceration than others. Future research should consider all these nuances.



Finally, aspects of the FFCWB need to be taken into account when interpreting these analyses because the operationalization of risk is defined specifically to this sample. Families in the FFCWB—because of the oversample of unmarried parents—are, on average, economically and socially disadvantaged, and the results need to be interpreted in that context. The FFCWB likely does not include the most advantaged families; children in Stratum 1 (the most advantaged group) are still relatively disadvantaged. Therefore, if the results were replicated with a national sample of children that included a group of children who were more advantaged than those in Stratum 1, the heterogeneous relationships would possibly be stronger (if these children experienced even worse effects) or curvilinear (if these children experienced no effects). Future nationally representative data collection efforts should ask about paternal incarceration.

## Conclusions

These findings extend prior research on the intergenerational consequences of paternal incarceration by showing that an examination of average relationships masks substantial heterogeneity. In doing so, these findings contribute to two distinct literatures: (1) a rapidly burgeoning literature on the consequences of mass incarceration, one that mostly ignores the heterogeneous effects of incarceration on men, women, and children (although see, e.g., Geller et al. 2012; Turanovic et al. 2012; Turney and Wildeman 2013, 2015); and (2) a long-standing literature on childhood inequalities that mostly ignores the penal system as a massive mechanism of social stratification (although see, e.g., Wakefield and Wildeman 2013). These findings have a number of implications. Specifically, they suggest that the intergenerational consequences of paternal incarceration are more complicated than previously documented. More generally, the results suggest that research on family inequality should consider both differential selection into treatments and differential responses to treatments. Although children who experience paternal incarceration are some of the most disadvantaged and vulnerable children, the consequences of incarceration are, for five of the six outcomes considered, larger among the least vulnerable of these vulnerable children—that is, those children with relatively low risks of experiencing paternal incarceration. Taken in conjunction with the fact that problem behaviors and cognitive skills may have lasting implications for future delinquency (Moffitt 1993; Nagin and Tremblay 1999), as well as educational and occupational success (Featherman and Hauser 1978), these findings suggest that the penal system may shape inequalities not only during childhood but throughout the life course, in complex, countervailing, and heterogeneous ways.

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## References

- Allison, P. D. (2001). *Missing data*. New York, NY: Sage Publications.
- Amato, P. R. (2001). Children of divorce in the 1990s: An update of the Amato and Keith (1991) meta-analysis. *Journal of Family Psychology*, *15*, 355–370.
- Amato, P. R., & Gilbreth, J. G. (1999). Nonresident fathers and children's well-being: A meta-analysis. *Journal of Marriage and Family*, *61*, 557–573.
- Apel, R., Blokland, A. A. J., Nieuwbeerta, P., & van Schellen, M. (2010). The impact of imprisonment on marriage and divorce: A risk set matching approach. *Journal of Quantitative Criminology*, *26*, 269–300.
- Arditti, J. A. (2015). Family process perspective on the heterogeneous effects of maternal incarceration on child wellbeing. *Criminology & Public Policy*, *14*, 169–182.
- Becker, S. O., & Caliendo, M. (2007). Sensitivity analysis for average treatment effects. *Stata Journal*, *7*, 71–83.
- Bodner, T. E. (2008). What improves with increased missing data imputations? *Structural Equation Modeling: A Multidisciplinary Journal*, *15*, 651–675.
- Boss, P. (2007). Ambiguous loss theory: Challenges for scholars and practitioners. *Family Relations*, *56*, 105–111.
- Braman, D. (2004). *Doing time on the outside: Incarceration and family life in urban America*. Ann Arbor: University of Michigan.
- Brand, J. E., & Xie, Y. (2010). Who benefits most from college? Evidence for negative selection in heterogeneous economic returns to higher education. *American Sociological Review*, *75*, 273–302.
- Breen, R., Choi, S., & Holm, A. (2015). Heterogeneous causal effects and sample selection bias. *Sociological Science*, *2*, 351–369.
- Bronfenbrenner, U., & Morris, P. A. (1998). The ecology of developmental processes. In W. Damon & R. M. Lerner (Eds.), *Handbook of child psychology: Theoretical models of human development* (Vol. 1, pp. 993–1028). New York, NY: Wiley.
- Caliendo, M., & Kopeinig, S. (2008). Some practical guidance for the implementation of propensity score matching. *Journal of Economic Surveys*, *22*, 31–72.
- Carlson, M. J., & Corcoran, M. E. (2001). Family structure and children's behavioral and cognitive outcomes. *Journal of Marriage and Family*, *63*, 779–792.
- Carson, E. A. (2014). *Prisoners in 2013* (Bureau of Justice Statistics Bulletin, No. NCJ 247282). Washington, DC: U.S. Department of Justice.
- Comfort, M. L. (2008). *Doing time together: Love and family in the shadow of the prison*. Chicago, IL: The University of Chicago Press.
- DiPrete, T. A., & Eirich, G. M. (2006). Cumulative advantage as a mechanism for inequality: A review of theoretical and empirical developments. *Annual Review of Sociology*, *32*, 271–297.
- Duncan, G. J., Brooks-Gunn, J., & Klebanov, P. K. (1994). Economic deprivation and early-childhood development. *Child Development*, *65*, 296–318.
- Dunn, L. M., & Dunn, L. M. (1997). *Examiner's manual for the Peabody Picture Vocabulary Test* (3rd ed.). Circle Pines, MN: American Guidance Services, Inc..
- Eaton, W. W. (1978). Life events, social supports, and psychiatric symptoms: A re-analysis of the New Haven data. *Journal of Health and Social Behavior*, *19*, 230–234.
- Eddy, J. M., & Poehlmann, J. (2010). *Children of incarcerated parents: A handbook for researchers and practitioners*. Washington, DC: Urban Institute Press.

- Edin, K., Nelson, T. J., & Paranal, R. (2004). Fatherhood and incarceration as potential turning points in the criminal careers of unskilled men. In M. Patillo, D. Weiman, & B. Western (Eds.), *Imprisoning America: The social effects of mass incarceration* (pp. 46–75). New York, NY: Russell Sage Foundation.
- Elliott, D. S., Huizinga, D., & Menard, S. (1989). *Multiple problem youth: Delinquency, substance use, and mental health*. New York, NY: Springer-Verlag.
- Farkas, G. (2003). Cognitive skills and noncognitive traits and behaviors in stratification processes. *Annual Review of Sociology*, 29, 541–562.
- Featherman, D., & Hauser, R. (1978). *Opportunity and change*. New York, NY: Academic Press.
- Foster, H., & Hagan, J. (2007). Incarceration and intergenerational social exclusion. *Social Problems*, 54, 399–433.
- Foster, H., & Hagan, J. (2009). The mass incarceration of parents in America: Issues of race/ethnicity, collateral damage to children, and prisoner reentry. *Annals of the American Academy of Political and Social Science*, 623, 179–194.
- Foster, H., & Hagan, J. (2015). Punishment regimes and the multilevel effects of parental incarceration: Intergenerational, intersectional, and interinstitutional models of social inequality and exclusion. *Annual Review of Sociology*, 41, 135–158.
- Geller, A., Cooper, C. E., Garfinkel, I., Schwartz-Soicher, O., & Mincy, R. B. (2012). Beyond absenteeism: Father incarceration and its effects on children's development. *Demography*, 49, 49–76.
- Geller, A., Garfinkel, I., Cooper, C. E., & Mincy, R. B. (2009). Parental incarceration and child well-being: Implications for urban families. *Social Science Quarterly*, 90, 1187–1202.
- Geller, A., Garfinkel, I., & Western, B. (2011). Paternal incarceration and support for children in fragile families. *Demography*, 48, 25–47.
- Geller, A., Jaeger, K., & Pace, G. T. (2016). Surveys, records, and the study of incarceration in families. *Annals of the American Academy of Political and Social Science*, 665, 22–43.
- Giordano, P. C., & Copp, J. E. (2015). "Packages" of risk. *Criminology & Public Policy*, 14, 157–168.
- Gottfredson, M. R., & Hirschi, T. (1990). *A general theory of crime*. Palo Alto, CA: Stanford University Press.
- Graham, J. W., Olchowski, A. E., & Gilreath, T. D. (2007). How many imputations are really needed? Some practical clarifications of multiple imputation theory. *Prevention Science*, 8, 206–213.
- Groves, R. M. (2004). *Survey errors and survey costs*. Hoboken, NJ: Wiley.
- Hagan, J., & Dinovitzer, R. (1999). Collateral consequences of imprisonment for children, communities, and prisoners. *Crime and Justice*, 26, 121–162.
- Hagan, J., & Foster, H. (2012). Intergenerational educational effects of mass imprisonment in America. *Sociology of Education*, 85, 259–286.
- Hannon, L. (2003). Poverty, delinquency, and educational attainment: Cumulative disadvantage or disadvantage saturation? *Sociological Inquiry*, 73, 575–594.
- Haskins, A. R. (2014). Unintended consequences: Effects of paternal incarceration on child school readiness and later special education placement. *Sociological Science*, 1, 141–158.
- Haskins, A. R. (2015). Paternal incarceration and child-reported behavioral functioning at age 9. *Social Science Research*, 52, 18–33.
- Hawkins, D. N., Amato, P. R., & King, V. (2007). Nonresident father involvement and adolescent well-being: Father effects or child effects? *American Sociological Review*, 72, 990–1010.
- Heckman, J. J., Stixrud, J., & Urzua, S. (2006). The effects of cognitive and noncognitive abilities on labor market outcomes and social behavior. *Journal of Labor Economics*, 24, 411–482.
- Imai, K., Keele, L., & Yamamoto, T. (2010). Identification, inference and sensitivity analysis for causal mediation effects. *Statistical Science*, 25, 51–71.
- Jann, B., Brand, J. E., & Xie, Y. (2007). *HTE: Stata module to perform heterogeneous treatment effect analysis* (Statistical Software Components S457129). Boston, MA: Boston College Department of Economics.
- Johnson, E. I., & Easterling, B. (2012). Understanding unique effects of parental incarceration on children: Challenges, progress, and recommendations. *Journal of Marriage and Family*, 74, 342–356.
- Johnson, R. (2009). Ever-increasing levels of parental incarceration and the consequences for children. In M. A. Stoll (Ed.), *Do prisons make us safer? The benefits and costs of the prison boom* (pp. 177–206). New York, NY: Russell Sage Foundation.
- Lopoo, L. M., & Western, B. (2005). Incarceration and the formation and stability of marital unions. *Journal of Marriage and Family*, 67, 721–734.
- Massoglia, M., Remster, B., & King, R. D. (2011). Stigma or separation? Understanding the incarceration-divorce relationship. *Social Forces*, 90, 133–155.
- Maumary-Gremaud, A. (2000). *Things that you have done: Grade 4/Year 5 (FAST Track Project technical report)*. Retrieved from [fasttrackproject.org/techrept/t/tyd/tyd5tech.pdf](http://fasttrackproject.org/techrept/t/tyd/tyd5tech.pdf)

- McKown, C., & Weinstein, R. S. (2003). The development and consequences of stereotype consciousness in middle childhood. *Child Development, 74*, 498–515.
- McLanahan, S. S. (2009). Fragile families and the reproduction of poverty. *Annals of the American Academy of Political and Social Science, 621*, 111–131.
- Moffitt, T. E. (1993). Adolescence-limited and life-course-persistent antisocial behavior: A developmental taxonomy. *Psychological Review, 100*, 674–701.
- Morgan, S. L., & Winship, C. (2007). *Counterfactuals and causal inference: Methods and principles for social research*. New York, NY: Cambridge University Press.
- Mumola, C. J. (2000). *Incarcerated parents and their children* (Bureau of Justice Statistics Special Report, No. NCJ 182335). Washington, DC: U.S. Department of Justice.
- Murray, J., & Farrington, D. P. (2005). Parental imprisonment: Effects on boys' antisocial behaviour and delinquency through the life-course. *Journal of Child Psychology and Psychiatry, 46*, 1269–1278.
- Murray, J., & Farrington, D. P. (2008). The effects of parental imprisonment on children. *Crime and Justice, 37*, 133–206.
- Murray, J., Farrington, D. P., & Sekol, I. (2012a). Children's antisocial behavior, mental health, drug use, and educational performance after parental incarceration: A systematic review and meta-analysis. *Psychological Bulletin, 138*, 175–210.
- Murray, J., Loeber, R., & Pardini, D. (2012b). Parental involvement in the criminal justice system and the development of youth theft, marijuana use, depression, and poor academic performance. *Criminology, 50*, 255–302.
- Nagin, D., & Tremblay, R. E. (1999). Trajectories of boys' physical aggression, opposition, and hyperactivity on the path to physically violent and nonviolent juvenile delinquency. *Child Development, 70*, 1181–1196.
- Nichols, E. B., & Loper, A. B. (2012). Incarceration in the household: Academic outcomes of adolescents with an incarcerated household member. *Journal of Youth and Adolescence, 41*, 1455–1471.
- Osborne, C., & McLanahan, S. (2007). Partnership instability and child well-being. *Journal of Marriage and Family, 69*, 1065–1083.
- Patemoster, R., Brame, R., Mazerolle, P., & Piquero, A. (1998). Using the correct statistical test for the equality of regression coefficients. *Criminology, 36*, 859–866.
- Pearlin, L. I. (1989). The sociological study of stress. *Journal of Health and Social Behavior, 30*, 241–256.
- Pettit, B. (2012). *Invisible men: Mass incarceration and the myth of black progress*. New York, NY: Russell Sage Foundation.
- Reichman, N. E., Teitler, J. O., Garfinkel, I., & McLanahan, S. (2001). Fragile families: Sample and design. *Children and Youth Services Review, 23*, 303–326.
- Rosenbaum, P. R. (2002). *Observational studies* (2nd ed.). New York, NY: Springer.
- Rosenbaum, P. R. (2010). Design sensitivity and efficiency in observational studies. *Journal of the American Statistical Association, 105*, 692–702.
- Rosenbaum, P. R., & Rubin, D. B. (1984). Reducing bias in observational studies using subclassification on the propensity score. *Journal of the American Statistical Association, 79*, 516–524.
- Sampson, R. J. (2011). The incarceration ledger: Toward a new era in assessing societal consequences. *Criminology & Public Policy, 10*, 819–828.
- Sassler, S., & McNally, J. (2003). Cohabiting couples' economic circumstances and union transitions: A re-examination using multiple imputation techniques. *Social Science Research, 32*, 553–578.
- Schafer, M. H., Wilkinson, L. R., & Ferraro, K. F. (2013). Childhood (mis)fortune, educational attainment, and adult health: Contingent benefits of a college degree? *Social Forces, 91*, 1007–1034.
- Schwartz-Soicher, O., Geller, A., & Garfinkel, I. (2011). The effect of paternal incarceration on material hardship. *Social Service Review, 85*, 447–473.
- Shadish, W. R. (2013). Propensity score analysis: Promise, reality and irrational exuberance. *Journal of Experimental Criminology, 9*, 129–144.
- Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Boston, MA: Cengage Learning.
- Sharkey, P. (2010). The acute effect of local homicides on children's cognitive performance. *Proceedings of the National Academy of Sciences, 107*, 11733–11738.
- Siegel, J. A. (2011). *Disrupted childhoods: Children of women in prison*. New Brunswick, NJ: Rutgers University Press.
- Travis, J., Western, B., & Redburn, S. (2014). *The growth of incarceration in the United States: Exploring causes and consequences*. Washington, DC: National Academies Press.
- Turanovic, J. J., Rodriguez, N., & Pratt, T. C. (2012). The collateral consequences of incarceration revisited: A qualitative analysis of the effects of caregivers of children of incarcerated parents. *Criminology, 50*, 913–959.

- Turney, K. (2011). Chronic and proximate depression among mothers: Implications for child well-being. *Journal of Marriage and Family*, *73*, 149–163.
- Turney, K. (2014). The consequences of paternal incarceration for maternal neglect and harsh parenting. *Social Forces*, *92*, 1607–1636.
- Turney, K. (2015). Beyond average effects: Incorporating heterogeneous treatment effects into family research. *Journal of Family Theory & Review*, *7*, 468–481.
- Turney, K., & Haskins, A. R. (2014). Falling behind? Children's early grade retention after paternal incarceration. *Sociology of Education*, *87*, 241–258.
- Turney, K., & Wildeman, C. (2013). Redefining relationships: Explaining the countervailing consequences of paternal incarceration for parenting. *American Sociological Review*, *78*, 949–979.
- Turney, K., & Wildeman, C. (2015). Detrimental for some? The heterogeneous effects of maternal incarceration on child wellbeing. *Criminology & Public Policy*, *14*, 125–156.
- Wakefield, S., & Uggen, C. (2010). Incarceration and stratification. *Annual Review of Sociology*, *36*, 387–406.
- Wakefield, S., & Wildeman, C. (2011). Mass imprisonment and racial disparities in childhood behavioral problems. *Criminology & Public Policy*, *10*, 793–817.
- Wakefield, S., & Wildeman, C. (2013). *Children of the prison boom: Mass incarceration and the future of American inequality*. New York, NY: Oxford University Press.
- Western, B. (2006). *Punishment and inequality in America*. New York, NY: Russell Sage Foundation.
- Wheaton, B. (1982). A comparison of the moderating effects of personal coping resources on the impact of exposure to stress in two groups. *Journal of Community Psychology*, *10*, 293–311.
- Wheaton, B. (1990). Life transitions, role histories, and mental health. *American Sociological Review*, *55*, 209–223.
- White, I. R., Royston, P., & Wood, A. M. (2011). Multiple imputation using chained equations: Issues and guidance for practice. *Statistics in Medicine*, *30*, 377–399.
- Wight, V. R., Chau, M., & Aratani, Y. (2010). *Who are America's poor children? The official story* (NCCP brief). New York, NY: Columbia University, National Center for Children in Poverty.
- Wilbur, M. A. B., Marani, J. E., Appugliese, D., Woods, R., Siegel, J. A., Cabral, H. J., & Frank, D. A. (2007). Socioemotional effects of fathers' incarceration on low-income, urban, school-aged children. *Pediatrics*, *120*, e678–e685. doi:10.1542/peds.2006-2166
- Wildeman, C. (2009). Parental imprisonment, the prison boom, and the concentration of childhood disadvantage. *Demography*, *46*, 265–280.
- Wildeman, C. (2010). Paternal incarceration and children's physically aggressive behaviors: Evidence from the Fragile Families and Child Wellbeing Study. *Social Forces*, *89*, 285–309.
- Wildeman, C., & Turney, K. (2014). Positive, negative, or null? The effects of maternal incarceration on children's behavioral problems. *Demography*, *51*, 1041–1068.
- Wildeman, C., Wakefield, S., & Turney, K. (2013). Misidentifying the effects of parental imprisonment? A comment on Johnson and Easterling (2012). *Journal of Marriage and Family*, *75*, 252–258.
- Wildeman, C., & Waldfogel, J. (2014). Somebody's children or nobody's children? How the sociological perspective could enliven research on foster care. *Annual Review of Sociology*, *40*, 599–618.
- Wildeman, C., & Western, B. (2010). Incarceration in fragile families. *Future of Children*, *20*(2), 157–177.
- Woodcock, R. W., McGrew, K. S., & Mather, N. (2001). *Woodcock-Johnson III Tests of Achievement*. Itasca, IL: Riverside Publishing.
- Xie, Y., Brand, J. E., & Jann, B. (2012). Estimating heterogeneous treatment effects with observational data. *Sociological Methodology*, *42*, 314–347.