



Chains of Adversity: The Time-Varying Consequences of Paternal Incarceration for Adolescent Behavior

Kristin Turney¹

Accepted: 14 November 2020 / Published online: 5 February 2021

© The Author(s), under exclusive licence to Springer Science+Business Media, LLC part of Springer Nature 2021

Abstract

Objectives I draw on general strain theory, a framework often used to understand adolescent behavior, and augment it with aspects of the stress process perspective to examine the time-varying consequences of paternal incarceration for adolescent behavior.

Methods I use six waves of data from the Fragile Families and Child Wellbeing Study, a cohort of children born around the turn of the twenty-first century, and inverse probability of treatment weighting models to estimate the time-varying relationship between paternal incarceration and adolescent behavior problems and the mechanisms underlying this relationship.

Results Results document three main findings. First, adolescents exposed to paternal incarceration at any point in the life course have more behavior problems than their counterparts not exposed to paternal incarceration. Second, exposure to paternal incarceration during early childhood, but not during middle childhood or early adolescence, is positively associated with behavior problems. Third, this relationship is partially explained by family adversities stemming from paternal incarceration.

Conclusions This research builds on our criminological understanding of how strains, such as paternal incarceration, can facilitate inequalities in adolescent behavior by considering dynamic selection into paternal incarceration, the time-varying repercussions of paternal incarceration, and the mechanisms linking paternal incarceration to adolescent behavior. Early life course paternal incarceration facilitates chains of adversity that accumulate throughout early childhood, middle childhood, and adolescence.

Keywords Adolescence · Delinquency · General strain theory · Paternal incarceration · Stress process perspective

Introduction

General strain theory suggests that paternal incarceration, primarily experienced by economically disadvantaged children of color, has wide-ranging consequences for intergenerational social stratification (Agnew 1992; Foster and Hagan 2015; Turney 2014a; Wakefield

✉ Kristin Turney
kristin.turney@uci.edu

¹ University of California, Irvine, 3151 Social Science Plaza, Irvine, CA 92697-5100, USA

and Wildeman 2013). Paternal incarceration, a traumatic and stigmatizing adverse childhood experience that unfolds in broader family contexts, can facilitate additional strains such as tense parental relationships, economic and residential instability, and impaired parenting and mental health among children's caregivers. The strain of paternal incarceration, in conjunction with these accompanying proliferating strains, may increase behavior problems among adolescents (Agnew 1992; Porter and King 2015). Indeed, a growing literature documents that those exposed to paternal incarceration, compared to their counterparts, experience disadvantages (for reviews, see Foster and Hagan 2015; Johnson and Easterling 2012; Murray et al. 2012; Travis et al. 2014; Turney and Goodsell 2018; Wildeman and Western 2010). The relationship between paternal incarceration and offspring's behavior problems is especially robust (e.g., Geller et al. 2012; Haskins 2014; Turney 2017; Wildeman 2010).

Criminological research on the intergenerational consequences of incarceration can be extended in two ways. First, existing research predominantly treats the strain of paternal incarceration as a static event, despite the fact that children have different risks of exposure to paternal incarceration that co-occur with additional risks throughout the life course. Second, and relatedly, existing research rarely considers how the timing of paternal incarceration is differentially consequential for indicators of adolescent behavior such as delinquency, despite widespread criminological understanding that the timing of turning points may be particularly important for wellbeing (Laub and Sampson 1993). On the one hand, paternal incarceration occurring in early childhood may have especially large consequences for adolescent behavior, given that early life experiences facilitate a cascade of additional strains that can accumulate to impair functioning (Entwisle and Alexander 1989). On the other hand, paternal incarceration occurring in middle childhood or early adolescence may be especially consequential for adolescent behavior, as older children may more fully comprehend both the incarceration and the changes in family life stemming from the incarceration, or because recent strains can be especially deleterious (Agnew 1992; Conger et al. 1997).

In this paper, I draw on general strain theory, a framework often used to understand adolescent delinquency, and augment it with aspects of the stress process perspective. The stress process perspective, which emphasizes the concentration of stressors among already vulnerable individuals, highlights how initial stressors proliferate to create additional stressors, which can together have devastating consequences for wellbeing (Agnew 1992, 2006; Pearlin 1989; Pearlin et al. 1981). The proliferation of stressors necessitates a consideration of how both the risk of exposure to paternal incarceration and the consequences of paternal incarceration for adolescent behavior are time-varying. I examine this using longitudinal data from the Fragile Families and Child Wellbeing Study, a cohort of children born around the turn of the twenty-first century, to examine the relationship between paternal incarceration and four measures of adolescent behavior: internalizing problems, externalizing problems, attention problems, and delinquency. I examine this relationship in a counterfactual framework, via inverse probability of treatment weighting, that investigates both the time-varying risks and consequences of paternal incarceration, considering exposure in early childhood (ages 1–5), middle childhood (ages 5–9), and early adolescence (ages 9–15).

The manuscript contributes to criminological scholarship by providing a framework for integrating general strain theory with aspects of the stress process perspective. Relatedly, it advances our empirical understanding of how strains, such as paternal incarceration, facilitate inequalities in adolescent behavior, by considering dynamic selection into paternal incarceration, the time-varying consequences of paternal incarceration, and the

mechanisms linking paternal incarceration to adolescent behavior, all of which provide a more careful accounting of the repercussions of paternal incarceration than previously considered. Advancing our understanding of the consequences of paternal incarceration for adolescent behavior is particularly important because adolescence—a critical link between childhood and adulthood—is a time of significant psychological, physical, and social changes and because adolescent behavior can be linked to offending throughout the life course (Crosnoe and Johnson 2011; Dornbusch 1989; Moffitt and Caspi 2001). Furthermore, given the concentration of paternal incarceration among vulnerable and economically disadvantaged children, the findings have implications for the reproduction of social stratification (Foster and Hagan 2015).

Background

General strain theory is a valuable framework for understanding the consequences of paternal incarceration for adolescent behavior (Agnew 1992, 2006). General strain theory posits that strains, including the removal of a positive stimuli, facilitate negative emotions such as anger that ultimately lead adolescents to adapt unconventional behaviors. Exposure to paternal incarceration has been conceptualized as a strain that impedes coping with negative emotions (Hagan and Dinovitzer 1999). Paternal incarceration, especially if the offspring witnesses an arrest or court proceeding, may be a traumatic experience that engenders negative emotions such as anger (Agnew 1992; Hagan and Dinovitzer 1999). Indeed, recent research finds that the incapacitation of a father is a stressful life event that can lead to adolescent delinquency (Porter and King 2015). A large body of related research finds support for the applicability of general strain theory in predicting adolescent behavior (e.g., Aseltine et al. 2000; Hoffmann and Cerbone 1999; Paternoster and Mazerolle 1994; Piquero and Sealock 2000, 2004).

General strain theory, with its focus on strains and stressors stemming from negative life events, draws on the stress process perspective (Agnew 1992:57–58), a paradigm that emphasizes how stressors are most commonly endured by vulnerable social groups, how stressors unfold in a larger social context, and how stressors can have deleterious consequences for wellbeing (Pearlin et al. 1981; Pearlin 1989). But two aspects of the stress process perspective can concretely augment general strain theory to understand the consequences of paternal incarceration. First, strains or stressors (such as paternal incarceration) can proliferate to create additional strains, which together may have adverse consequences for adolescent behavior. Second, both risk of exposure to strains and reactions to strains can depend on the timing of their occurrence in the life course. I elaborate on both of these aspects below.

Proliferation of Strains and Adolescent Behavior

First, the stress process perspective can augment general strain theory in understanding the relationship between paternal incarceration and adolescent behavior with its focus on stress proliferation. The stress process perspective theorizes that stressors, or strains, emerge in a social context, with one stressor engendering additional stressors, and that the compounding and clustering nature of stressors induce impairments in wellbeing (Agnew 1992; Pearlin 1989; Pearlin et al. 1997; for research on adolescents, see Kort-Butler 2017; Slo-cum 2010). This allows for an explicit examination of mechanisms—aside from negative

emotions such as anger—that link strain to adolescent behavior. Also, insofar as the additional stressors facilitate negative emotions, this is consistent with general strain theory's proposition that the introduction of negative stimuli can lead to delinquency via negative emotions (Agnew 1992).

Mechanisms of Stress Proliferation

The strain of paternal incarceration can fundamentally change the family unit by facilitating an array of proliferating stressors, or strains, including compromised relationships, economic instability, impaired parenting, diminished mental health, and residential instability (Pearlin et al. 1997; Wheaton and Gotlib 1997), all of which could explain the deleterious consequences of paternal incarceration for adolescent behavior. First, paternal incarceration disrupts parental relationships, a proliferating stressor that may partially explain the deleterious consequences of paternal incarceration for adolescent behavior (Dwyer Emory 2018; Turney 2017). Incarceration limits contact with romantic partners, making maintaining romantic relationships difficult and leading to relationship dissolution (Braman 2004; Comfort 2008; Turney 2015a; Western 2006). Romantic partner incarceration is also associated with reduced relationship quality upon release (Turney 2015b). Given the durable links between family instability and adolescent behavior, disrupted parental relationships in the context of paternal incarceration may increase adolescent behavior problems (Fomby and Sennott 2013).

Second, the proliferating stressor of economic hardship may partially explain the deleterious consequences of paternal incarceration for adolescent behavior. Incarcerated fathers, many of whom provided economic resources to their family prior to confinement, experience a mechanical removal from the labor market, earning little (if any) income during incarceration and simultaneously accumulating fines, fees, and legal debts (Harris 2016). Upon release, the stigma of a criminal record makes finding and sustaining formal employment difficult (Pager 2003; Western 2006). Paternal incarceration also has economic implications for the broader family unit, altering employment patterns and increasing material hardship among romantic partners of the currently and formerly incarcerated (Bruns 2017; Schwartz-Soicher et al. 2011). In turn, economic hardship is tightly linked to adolescent wellbeing (Duncan et al. 1998).

Third, parenting impairments may be a proliferating stressor that links paternal incarceration and adolescent wellbeing. Currently and recently incarcerated fathers, compared to their counterparts, are less engaged with their children and less engaged in cooperative co-parenting with their children's mothers (Turney and Wildeman 2013). Mothers who share children with incarcerated fathers also experience parenting impediments, as they exhibit increased neglect and physical aggression following paternal incarceration (Turney 2014b). These parenting impairments may increase adolescent behavior problems (Carlson 2006).

Fourth, the relationship between paternal incarceration and adolescent behavior may be explained by the proliferating stressors of increased mental health problems and decreased social support. Currently and recently incarcerated fathers, compared to their counterparts, experience more mental health problems including depression (Turney et al. 2012a, b; also see Schnittker et al. 2012). The deleterious mental health consequences extend to mothers who share children with incarcerated men (Wildeman et al. 2012). Mothers connected to recently incarcerated fathers also report less perceived instrumental support (Turney et al.

2012a, b). Both impaired parental mental health and social support are detrimental to adolescent behavior (Goodman 2007).

Finally, the relationship between paternal incarceration and adolescent behavior may be explained by increased residential mobility and changes in neighborhood conditions. Paternal incarceration facilitates residential instability (Geller and Curtis 2011; Geller and Franklin 2014). Families are likely to move residences in the wake of paternal incarceration, likely due to some combination of changes in household composition (Turney 2014c) and changes in economic wellbeing (Schwartz-Soicher et al. 2011). Incarceration, partly due to challenges finding housing and economic hardship, means that individuals and their families are likely to live in disadvantaged neighborhoods after release (Massoglia et al. 2013; Western 2018). These proliferating stressors, residential mobility and neighborhood disadvantage, have harmful consequences for adolescent behavior (Leventhal and Brooks-Gunn 2000).

Selection into Paternal Incarceration

Although the stressor of paternal incarceration may proliferate to create additional stressors, all of which can contribute to inequalities in adolescent behavior, the relationship between paternal incarceration and adolescent behavior may be spurious. That is, observed differences between those exposed and not exposed to paternal incarceration may stem from selection into paternal incarceration. It is well known that individuals have different risks of experiencing paternal incarceration (Johnson and Easterling 2012). These risks are unequal across race/ethnicity and social class. For example, by age 14, Black children are more than six times as likely to experience paternal incarceration as White children (25% compared to 4%). Among those of parents without a high school diploma, more than half (51%) of Black children experience paternal incarceration, compared to 7% of White children (Wildeman 2009).

Additionally, an examination of the intergenerational consequences of incarceration must consider broader family processes associated with selectivity into exposure to paternal incarceration. Paternal incarceration unfolds in a broader family context (Giordano et al. 2019), and adolescents exposed to paternal incarceration are more likely than their counterparts to have experienced other forms of family instability, lived in households with income below the poverty line, and resided in disadvantaged neighborhoods (Wakefield and Wildeman 2013). They are also more likely to have experienced “packages of risk” that directly lead to paternal incarceration, including paternal substance use, violence, and other criminal activity (Giordano and Copp 2015; Giordano et al. 2019). It is especially important to distinguish exposure to these latter characteristics from exposure to paternal incarceration, as adolescents who experience paternal substance use, violence, or other criminal activity may experience strains resulting from these family contexts, which may contribute to their behaviors. Relatedly, social learning theories suggest an intergenerational transmission of behavior problems, with parents playing an important socialization role (Akers 2011; Hagan and Dinovitzer 1999).

Timing of Stressors and Adolescent Behavior

Second, the stress process perspective can augment general strain theory in understanding the relationship between paternal incarceration and adolescent behavior by its focus on the timing of stressors. The stress process perspective theorizes that one’s risk of exposure to

stressors and one's reactions to stressors depends on the timing of when these stressors occur in the life course (Pearlin 2009; Pearlin and Skaff 1996). The importance of timing is essential to the entirety of the stress process perspective, which fundamentally highlights how the broader context of stress unfolds over time, though this aspect of the stress process perspective is invoked less commonly than stress proliferation. Changing social conditions shape risk of exposure to stressors and, in turn, stressors have changing consequences for adolescent wellbeing (Pearlin and Skaff 1996).

Time-Varying Risk of Exposure to Strains

First, exposure to strains and stressors such as paternal incarceration is a process that extends and unfolds across time, with individuals having different risks of exposure throughout the life course. Therefore, it is important to analytically consider *dynamic* selection into paternal incarceration. Individuals have different risks of exposure to paternal incarceration throughout the life course (e.g., Swisher and Shaw-Smith 2015). Exposure to paternal incarceration is in part related to father's age, given the age-graded nature of criminal activity (Sampson and Laub 1992). Paternal incarceration is also shaped by co-occurring demographic, socioeconomic, and behavioral characteristics and shapes subsequent demographic, socioeconomic, and behavioral characteristics. Poverty, for example, often co-occurs with incarceration, with poverty leading to incarceration and vice versa (Western and Pettit 2010). This process, wherein the broader social context shapes exposure to a stressor that in turn shapes the social context, has critical methodological implications. Methodologically, accounting for the timing of family characteristics prior to incarceration and after incarceration—that is, dynamic selection into paternal incarceration—allows for a precise accounting of the intergenerational consequences of paternal incarceration and the mechanisms underlying these intergenerational consequences.

Time-Varying Consequences of Strains

Adolescents' behavioral reactions to strains and stressors may vary depending on when the strain occurs in the life course (Elder 1998; Pearlin and Skaff 1996). To that end, it is useful to situate exposure to strains such as paternal incarceration in the life course perspective, which highlights how event timing can be consequential for outcomes (Elder et al. 2003; Giordano et al. 2019; Laub and Sampson 1993; Pearlin 2009). The relationship between paternal incarceration and adolescent behavior likely depends upon when in the life course the offspring was first exposed to paternal incarceration. The stress process perspective highlights that the timing of strains and stressors may matter for outcomes, but it is agnostic as to whether exposure to stressors in early childhood, middle childhood, or adolescence is most consequential. General strain theory provides some indications that early childhood may be most consequential and other indications that middle childhood or adolescence may be most consequential.

On the one hand, paternal incarceration may be most consequential for adolescent behavior when it first occurs in early childhood. General strain theory suggests that delinquency stems from an inability to manage negative emotions, which may be most common among young children (Agnew 1992). Aside from general strain theory, other research suggests early childhood is a critical life course stage when children first develop competencies (Cherlin et al. 1998; Entwisle and Alexander 1989; Kowaleski-Jones and Duncan 1999; see Brooks-Gunn and Duncan 1997). Early childhood is also a life course stage when children

are especially dependent on their parents. Paternal incarceration during early childhood may trigger a cascade of strains in children's lives, strains that persist and accumulate during middle childhood and adolescence (Haskins 2015; Umberson et al. 2014). As described earlier, the stressor of paternal incarceration often triggers parental relationship dissolution, which could trigger family instability throughout childhood and adolescence. Similarly, paternal incarceration often initiates immediate economic hardship that persists throughout childhood and adolescence (Guo 1998; McLoyd 1998). These proliferating and cascading adversities stemming from paternal incarceration in early childhood, which itself is rooted in the broader family context, could have long-term deleterious consequences for adolescent behavior (Conger et al. 1994).

On the other hand, paternal incarceration may be most consequential for adolescent behavior when it first occurs in middle childhood or early adolescence. General strain theory suggests that recently occurring events create particular emotional challenges and, accordingly, paternal incarceration may be most consequential for adolescent behavior when it occurs in middle childhood or adolescence because it occurred temporally closer to the outcomes (Agnew 1992, 2006; Bryan 2017). Unjust strains are seen as especially consequential, and older children may have a heightened capacity for viewing paternal incarceration as unjust (Agnew 2012). Furthermore, as children spend time in school and develop peer groups, peer groups may become destructive and compound the already deleterious consequences of paternal incarceration. Additionally, those in middle childhood or early adolescence may be more aware of and therefore more susceptible to some of the proliferating strains of paternal incarceration (Conger et al. 1997; Mistry et al. 2002). In particular, adolescents may be asked to assist in their father's absence by doing chores, caring for younger siblings, and contributing to the family's economic wellbeing, all of which may impede their own wellbeing (Burton 2007).

Existing Research on the Timing of Paternal Incarceration

Research suggests that paternal incarceration is a strain on the family unit with radiating harmful ramifications for adolescents (Bryan 2017; Porter and King 2015; Roettger et al. 2011; Swisher and Shaw-Smith 2015; Turney and Goldberg 2019), though there is some evidence that paternal incarceration may be stress-relieving (such as in the case of domestic violence [Wildeman 2010] or severe substance abuse [Wakefield and Powell 2016]). Most research on the intergenerational consequences of incarceration examines paternal incarceration that occurred at some point in childhood (e.g., Foster and Hagan 2007; Roettger and Boardman 2012; Turney 2014a) or paternal incarceration that occurred within a specific narrow time frame (e.g., Geller et al. 2012; Haskins 2014; Turney and Haskins 2014; Wildeman 2010, 2014).

The relatively little research examining paternal incarceration timing comes to inconsistent conclusions. One study using the Panel Study of Income Dynamics (PSID) finds that incarceration among residential parents occurring between ages 0 and 5 and between ages 11 and 16, but not between ages 6 and 10, is associated with greater internalizing and externalizing behaviors (Johnson 2009). Three relevant studies use data from the National Longitudinal Study of Adolescent to Adult Health (Add Health). One finds that paternal incarceration occurring between ages 0 and 5, ages 6 and 12, and in adolescence is negatively associated with delinquency in adolescence (also see Besemer et al. 2011; Murray et al. 2007). This study also finds that paternal incarceration between ages 6 and 12 (but not between ages 0 and 5 nor in adolescence) is associated with greater depressive

symptoms among girls (Swisher and Shaw-Smith 2015). Another study finds that paternal incarceration occurring between ages 0 and 12, but not between ages 13 and 18, is associated with elevated substance use problems in adulthood (Foster and Hagan 2013; also see Kjellstrand and Eddy 2011). A final study concludes that parental incarceration before age 6 is associated with deleterious outcomes in adulthood including offending, marijuana use, depression, educational attainment, and earnings (Young et al. 2020). These studies are limited because the data do not allow for a consideration of dynamic selection into incarceration (and the study design, with its first wave during adolescence, means that control variables are necessarily measured after exposure to early childhood paternal incarceration, thus likely underestimating the association).

I extend this work by using longitudinal data to consider dynamic selection into paternal incarceration, a counterfactual framework that provides a more careful accounting of the consequences of paternal incarceration than previously considered. This approach allows for an examination of time-varying consequences and, in doing so, facilitates a precise investigation of the proliferating strains linking paternal incarceration to adolescent behavior (by allowing for an examination of changes in proposed mechanisms before and after paternal incarceration).

Data, Measures, and Analytic Strategy

Data

I estimate the time-varying relationship between paternal incarceration and adolescent behavior using data from the Fragile Families and Child Wellbeing Study, a cohort of 4898 children born to mostly unmarried parents in urban areas around the turn of the twenty-first century (Reichman et al. 2001). Children's biological parents were interviewed shortly after children were born, between February 1998 and September 2000, and these parents have been interviewed an additional five times over a 15-year period (when children were 1-, 3-, 5-, 9-, and 15-years old). About 86% of mothers and 78% of fathers in the sampling frame completed the baseline interview. Of these, 89%, 86%, 85%, and 76% of mothers and 69%, 67%, 64%, and 59% of fathers completed the 1-, 3-, 5-, and 9-year surveys, respectively. At the 15-year survey, about 77% of primary caregivers and 74% of adolescents were interviewed.

These data provide an excellent opportunity to examine the time-varying relationship between paternal incarceration and adolescent behavior, as they contain time-varying measures of paternal incarceration and time-varying measures of demographic, socioeconomic, and behavioral characteristics that are both antecedents and repercussions of paternal incarceration. Additionally, as the sample comprises relatively economically disadvantaged urban families, a substantial number of children experienced paternal incarceration. These data have been used extensively to understand the consequences of paternal incarceration for children (e.g., Geller et al. 2012; Haskins 2014; Turney 2017; Turney and Haskins 2014; Wildeman 2010). This manuscript extends this research by examining the intergenerational consequences of paternal incarceration in a time-varying counterfactual framework and, within this framework, by considering the mechanisms underlying this relationship.

The analytic sample comprises 3416 observations (70% of the baseline sample). I first excluded observations ($n=1469$) missing a primary caregiver or adolescent interview

at the 15-year survey (with 15 missing only a primary caregiver interview, 151 missing only an adolescent interview, and 1302 missing both interviews). I then excluded the additional observations ($n=13$) missing values on any of the four dependent variables. There are some small statistically significant differences between the baseline and analytic samples. Mothers in the analytic sample, compared to mothers in the baseline sample, are more likely to be non-Hispanic Black (50% compared to 48%), less likely to be Hispanic (25% compared to 27%), and less likely to be foreign-born (13% compared to 17%). At baseline, these mothers are also more likely to have a high school diploma (68% compared to 65%) and report expecting to work in the next year (71% compared to 68%). Parents in the baseline and analytic samples are similar across other demographic characteristics such as age, childhood family structure, relationship status, and poverty status. I used multiple imputation, producing and pooling results over 20 data sets, to preserve observations missing covariate data (including paternal incarceration) in the analytic sample.

Analytic Strategy

I describe the analytic strategy before providing details about variable measurement. The analyses employ both a time-varying framework and inverse probability of treatment weighting to estimate the relationship between paternal incarceration and adolescent behavior (Austin and Stuart 2015; Imbens 2000; Robins 1999). The time-varying framework allows for an accounting of dynamic selection into paternal incarceration (Brand and Xie 2007). The inverse probability of treatment weighting allows for a consideration of the relationship between paternal incarceration and adolescent behavior in a counterfactual framework, important given that research consistently shows how paternal incarceration operates within a broader family context (Johnson and Easterling 2012). Correlates of exposure to paternal incarceration include structural characteristics such as race/ethnicity and social class. Correlates also include factors such as fathers' prior contact with the criminal justice system (including prior incarceration), fathers' substance abuse, and fathers' involvement in criminal activity (Giordano et al. 2019; Wakefield and Wildeman 2013). The inverse probability of treatment framework allows for an accounting of these observed characteristics.¹

Stage One: Considering Exposure to Any Paternal Incarceration

In the first analytic stage, I employ inverse probability of treatment weighting with regression adjustment to estimate the relationship between any exposure to paternal incarceration and adolescent behavior (Austin and Stuart 2015). I consider whether adolescents who experienced paternal incarceration would have different outcomes if they had not experienced paternal incarceration, with the treatment group comprising adolescents who experienced paternal incarceration between the 1- and 15-year surveys and the control group comprising adolescents who did not experience paternal incarceration during this time.

¹ Propensity score matching is a similar (and commonly used) way of considering observed pre-existing differences between treatment and control groups. However, inverse probability of treatment weighting is advantageous because (1) Stata programs can compute proper standard errors and (2) this approach, unlike propensity score matching, does not have the potential to increase imbalance and bias (King and Nielsen 2016). However, supplemental analyses that instead match on the propensity score (nearest neighbor matching and kernel matching) produce consistent results.

First, I generate a propensity score (p) that estimates the likelihood an adolescent experienced any paternal incarceration. The propensity score, which ranges from 0 to 1, is based on time-invariant and time-varying controls measured at the 1-year survey (and therefore prior to paternal incarceration, see “Appendix Table 7”).²

Second, I use the propensity score to compute the estimated inverse probability weights, with adolescents in the treatment group given a weight of 1 and adolescents in the control group given a weight of $(1-p)/p$. This creates a synthetic sample with covariates that are independent of paternal incarceration exposure (Austin and Stuart 2015).

Third, I use these weights to compute the differences in outcomes between the treatment and control groups. That is, the probability weights correct for missing data (or the fact that each observation is only observed experiencing or not experiencing the treatment), with treatment observations similar to control observations given more weight and treatment observations dissimilar to control observations given less weight. The difference in outcomes is doubly robust, as I further adjust for all time-stable and time-varying covariates. These estimates are unbiased under the ignorability assumption, which suggests there are no unmeasured confounders, a point I return to below (Imbens 2000).

Stage Two: Considering Time-Varying Exposure to Paternal Incarceration

In the second analytic stage, I account for dynamic selection into paternal incarceration by estimating time-varying models, a conceptual framework outlined by Brand and Xie (2007). The framework highlights how both exposure to treatments and effects of treatments may vary over time. I consider the treatment, paternal incarceration, at three time intervals that correspond to survey waves: early childhood (between the 1- and 5-year surveys), middle childhood (between the 5- and 9-year surveys), and early adolescence (between the 9- and 15-year surveys). Importantly, the main analyses consider first exposure to parental incarceration to strengthen causal inference (Brand and Simon Thomas 2013; Brand and Xie 2007). Supplemental analyses (described below) consider repeated exposure.

The first model includes all adolescents, separated into a treatment group (paternal incarceration in early childhood) and a control group (no paternal incarceration in early childhood). As in the first analytic stage, observations in the control group are weighted based on their inverse probability of experiencing the treatment. The probability is estimated as a function of time-invariant variables and time-varying variables measured at the 1-year survey (therefore considering the broader context in which paternal incarceration occurs while being measured temporally prior to paternal incarceration exposure). These weights are used to compute the differences in adolescent outcomes between the treatment and control groups. The difference in outcomes is doubly robust.

The second model excludes observations no longer at risk of first exposure to paternal incarceration, those who experienced paternal incarceration in early childhood. The remaining observations are separated into a treatment group (exposure in middle childhood) and a control group (no exposure in middle childhood). Propensity scores are generated as a function of time-invariant controls and time-varying controls measured at the 5-year survey (therefore again considering the context in which paternal incarceration

² The difference in outcomes also adjusts for two characteristics at the 15-year survey: primary caregiver type (mother, father, other) and adolescent age.

occurs while being measured temporally prior to paternal incarceration exposure). I use the inverse probability of treatment weights to compute doubly robust differences in outcomes between the treatment and control groups.

The third model excludes observations no longer at risk of first exposure to paternal incarceration, those who experienced paternal incarceration in early or middle childhood. The remaining adolescents are separated into a treatment group (exposure in early adolescence) and a control group (no exposure in early adolescence). Propensity scores are generated as a function of time-stable and time-varying variables measured at the 9-year survey. I again use the inverse probability of treatment weights to compute the doubly robust differences in adolescent outcomes between the groups.

Stage Three: Examining Mechanisms Linking Paternal Incarceration to Adolescent Behavior

Previewing the results, the time-varying models show that paternal incarceration in early childhood, but not in middle childhood or early adolescence, has deleterious consequences for adolescent behavior. Therefore, the third analytic stage applies the inverse probability of treatment weights to examine five sets of mechanisms that might explain the relationship between early childhood paternal incarceration and adolescent behavior: (1) the parental relationship, measured by parental separation and relationship quality; (2) economic well-being, measured by poverty and material hardship; (3) parenting, measured by engagement, shared responsibility, and cooperation; (4) health, measured by depression and perceived social support; and (5) residence, measured by residential moves and neighborhood disadvantage. The mechanisms are all measured at the 9-year survey and, therefore, after first exposure to paternal incarceration but prior to the measurement of adolescent outcomes.³

I first estimate the relationship between paternal incarceration in early childhood and each of the proposed mechanisms (with OLS or logistic regression, depending on the distribution of the outcome variable). Next I estimate the relationship between paternal incarceration in early childhood and adolescent behavior without the mechanisms and with the mechanisms (Baron and Kenny 1986). I compare the baseline model, the inverse probability of treatment model with regression adjustment from the second analytic stage, to additional models that further adjust for the proposed mechanisms. Note that each of these potential mechanisms are included in the inverse probability of treatment weighting at an earlier time point. I also conduct formal Sobel-Goodman tests and use the counterfactual framework to examine mediation (Imai et al. 2010; MacKinnon et al. 1995). Importantly, as the mechanisms are not randomly assigned, these analyses should be taken as suggestive, as opposed to definitive, estimates of causal mediation (Elwert and Winship 2014; Imai et al. 2010).

³ These analyses examine mechanisms measured at the 9-year survey, to ensure they are measured both after the treatment and prior to adolescent outcomes, but results are substantively similar if instead measuring the mechanisms at the 5-year survey; at the 15-year survey; or at the 5-, 9-, and 15-year surveys.

Measures

Adolescent Behavior

The outcome variables comprise four measures of adolescent behavior, measured at the 15-year survey: (1) internalizing problems, (2) externalizing problems, (3) attention problems, and (4) delinquency. Internalizing, externalizing, and attention problems are constructed from primary caregiver responses to questions from the Child Behavior Checklist (CBCL) (0 = *not true*, 1 = *sometimes true*, and 2 = *often true*). Internalizing problems is an average of responses to eight statements such as “child cries a lot” and “child feels worthless or inferior” ($\alpha = .79$). Externalizing problems is an average of responses to 20 statements such as “child gets in many fights” and “child has temper tantrums or a hot temper” ($\alpha = .88$). Attention problems is an average of responses to three statements such as “child can’t concentrate or can’t pay attention for long” and “child is impulsive or acts without thinking” ($\alpha = .81$). The fourth measure, delinquency, is constructed by adolescent responses to 13 statements about delinquency behavior in the past year such as “paint graffiti or signs on someone else’s property or in a public place” and “deliberately damage property that didn’t belong to you” (1 = *never*, 2 = *one or two times*, 3 = *three or four times*, and 4 = *five or more times*; $\alpha = .75$). All outcome variables are standardized to facilitate comparisons across outcomes.

Paternal Incarceration

I measure paternal incarceration, which accounts for both jail incarceration (including those awaiting trial and those serving jail sentences) and prison incarceration, in two ways. First, a binary variable indicates the child ever experienced the incarceration of his/her biological father (between the 1- and 15-year surveys). I examine paternal incarceration between the 1- and 15-year surveys, as opposed to between the baseline and 15-year surveys because the 1-year survey does not allow one to construct a measure of paternal incarceration between the baseline and 1-year surveys (and, instead, it is only possible to construct a measure of any paternal incarceration prior to the 1-year survey (including prior to baseline). Also, as many control variables are first ascertained at the 1-year survey, this measurement ensures the control variables are measured prior to first paternal incarceration exposure. This indicator of paternal incarceration is created using information from the 3-, 5-, 9-, and 15-year parent surveys. There are multiple opportunities to identify paternal incarceration in these surveys, including both direct (e.g., mother indicating father spent any time in jail or prison since the last survey) and indirect (e.g., mother reporting relationship dissolved due to incarceration) reports (Geller et al. 2012, 2016). More than one-third (35.9%) of children experienced paternal incarceration by age 15.

The second measure of paternal incarceration is a series of non-mutually exclusive binary variables, also measured by direct and indirect reports: early childhood exposure (between the 1- and 5-year surveys), middle childhood exposure (between the 5- and 9-year surveys), and early adolescence exposure (between the 9- and 15-year surveys).⁴ About one-quarter (24.8%) experienced paternal incarceration during early childhood, 12.0%

⁴ The measures of paternal incarceration timing necessarily correspond to the timing of the survey waves, but this timing roughly corresponds to early childhood, middle childhood, and adolescence and how timing of paternal incarceration has been operationalized in previous research (e.g., Swisher and Shaw-Smith 2015).

during middle childhood (with 8.0% of the analytic sample experiencing a first-time paternal incarceration), and 16.3% during early adolescence (with 7.3% experiencing a first-time paternal incarceration). Importantly, fathers' incarceration history (before the 1-year survey, including prior to birth) is associated with children's exposure to paternal incarceration, a point I return to below. Children are more likely to endure paternal incarceration during early childhood if their father has an incarceration history (50.1% compared to 26.0% of other children). They are also more likely to endure first-time paternal incarceration during middle childhood (30.6% compared to 25.6%) and adolescence (60.7% compared to 22.9%).

Time-Invariant Controls

The analyses adjust for time-invariant variables, measured at baseline unless otherwise noted. Mother's and father's demographic characteristics include race/ethnicity (White [non-Hispanic], Black [non-Hispanic], Hispanic, other race[non-Hispanic]), immigrant status, age at first birth (mothers only), and family structure in adolescence (1 = lived with both biological parents at age 15). Mother's and father's cognitive ability is measured with the Wechsler Adult Intelligence Scale (WAIS) at the 3-year survey (Wechsler 1997). Mother's and father's impulsivity comprises an average of responses to six questions from Dickman's (1990) impulsivity scale at the 5- and 1-year surveys, respectively ($\alpha = .86$ and $.84$). A binary variable indicates the father experienced incarceration prior to the 1-year survey (including prior to baseline). Adolescent characteristics include gender, low birth weight, temperament (reported by mothers at the 1-year survey, $\alpha = .53$), and age at the 15-year survey. Analyses also adjust for the primary caregiver's relationship (mother, father, other) to the adolescent at the 15-year survey.

Time-Varying Controls

The analyses adjust for time-varying variables measured at the 1-, 5-, and 9-year surveys. As described above, time-varying control variables are measured at the survey wave immediately prior to the measure of paternal incarceration (e.g., measured at the 1-year survey for estimates of paternal incarceration in early childhood).

Time-varying family characteristics include mother's and father's relationship status (married, cohabiting, non-residential romantic relationship, separated), repartnership, relationship quality (1 = *poor* to 5 = *excellent*), number of children in the household, residence with their own mother, and domestic violence (1 = other parent slaps, kicks, or hits).

Time-varying economic characteristics include mother's and father's education (less than high school, high school diploma or GED, more than high school), employment (1 = worked for pay in the last week), poverty (1 = household income below the official poverty threshold established by the U.S. Census Bureau), and material hardship (a count of variables indicating hardship in the past year such as "did not pay the full amount of rent or mortgage payments").

Time-varying parenting characteristics include mother's and father's parenting stress, an average of responses to four statements including "I often feel tired, worn out, or exhausted from raising a family" ($\alpha = .60$ to $.66$ for mothers and $\alpha = .56$ to $.65$ for fathers, depending on the survey wave); mother's and father's engagement, an average of responses to between eight and 13 statements, depending on the child's age, that captures the frequency of activities including "read stories to child" ($\alpha = .68$ to $.80$ for

Table 1 Time-invariant sample characteristics

Variable	M or %	(S.D.)
Mother race/ethnicity		
White (non-Hispanic)	21.8%	
Black (non-Hispanic)	50.0%	
Hispanic	24.6%	
Other race (non-Hispanic)	3.5%	
Mother and father a mixed race couple	14.8%	
Mother foreign-born	13.3%	
Father foreign-born	14.7%	
Mother age at first birth	21.56	(5.24)
Mother lived with biological parents at age 15	41.8%	
Father lived with biological parents at age 15	43.8%	
Mother cognitive skills (3-year survey)	6.79	(2.66)
Father cognitive skills (3-year survey)	6.51	(2.75)
Mother impulsive behaviors (5-year survey)	1.52	(.48)
Father impulsive behaviors (1-year survey)	2.03	(.69)
Father prior incarceration (1-year survey)	32.0%	
Child is boy	51.4%	
Child born low birth weight	9.2%	
Child temperament (1-year survey)	3.41	(.77)
Child primary caregiver (15-year survey)		
Mother	88.1%	
Father	7.0%	
Other	4.9%	
Child age (15-year survey)	15.59	(.76)
N	3416	

Characteristics measured at baseline unless otherwise noted

mothers and $\alpha = .89$ to $.93$ for fathers); mother's reports of shared responsibility in parenting, an average of responses to four statements including "father looks after child when you need to do things" ($\alpha = .89$ to $.93$); and mother's reports of cooperation in parenting, an average of responses to six statements including "can trust father to take good care of child" ($\alpha = .95$ to $.97$).

Time-varying health characteristics include mother's and father's depression, measured by the Composite International Diagnostic Instrument Short Form (CIDI-SF) (Kessler et al. 1998); overall health (1 = *poor* to 5 = *excellent*); binge drinking, measured by an affirmative report of having five or more drinks in one sitting in the past month at the 1-year survey and by having four or more drinks in one sitting in the past month at the subsequent surveys; drug use, measured by an affirmative report of using drugs (sedatives, tranquilizers, amphetamines, analgesics, inhalants, marijuana, cocaine or crack, LSD, heroin, or other illicit drugs) without a doctor's prescription, in larger amounts than prescribed, or for a longer period than prescribed in the past month; and perceived social support (a count of six types of available support including a \$200 loan and emergency child care).

Time-varying housing characteristics include mother's and father's residential mobility (1 = moved since last survey) and neighborhood disadvantage, measured as a

standardized sum of the following Census tract characteristics: percentage more than 25-years old without a high school degree, percentage unemployed in the civilian labor force, percentage living below the poverty line, and percentage receiving public assistance.

Finally, the analyses adjust for a time-varying indicator of maternal incarceration (measured as any incarceration since the prior survey wave).

Sample Description

Table 1 presents time-invariant sample characteristics. The majority of children's mothers identify as Black (50.0%), followed by Hispanic (24.6%), White (21.8%), and other race (3.5%). About 13% of mothers and 15% of fathers were born outside the United States. On average, mothers had their first child at age 22. Nearly one-third (32.0%) of fathers experienced incarceration prior to the 1-year survey.

Table 2 presents time-varying sample characteristics, showing that many correlates of paternal incarceration change over the 1-, 5-, and 9-year surveys. For example, the percentage of parents who have separated from one another increases over time (ranging from 33.6% at the 1-year survey to 59.7% at the 9-year survey). Relationship quality declines over time (with mother's and father's relationship quality averaging 3.24 and 3.52 at the 1-year survey and 2.77 and 3.09 at the 9-year survey, respectively). Additionally, while 42.4% of mothers and 34.3% of fathers had post-secondary education at the 1-year survey, this increases to 59.1% of mothers and 44.8% of fathers at the 9-year survey. Across all waves, about two-fifths of mothers (37.9–42.0%) and one-third of fathers (27.3–30.2%) had household incomes below the poverty line. See "Appendix Table 6" for time-invariant and time-varying sample characteristics by paternal incarceration.

Results

Estimating Adolescent Behavior as a Function of Paternal Incarceration

Table 3 presents estimates of how the strain of any exposure to paternal incarceration is associated with adolescent behavior. The unadjusted estimates, which compare children experiencing paternal incarceration during childhood or adolescence (the treatment group) to children not experiencing paternal incarceration during childhood or adolescence (the control group), show that paternal incarceration is associated with more internalizing problems ($b = 0.122$, $p < .01$), externalizing problems ($b = 0.356$, $p < .001$), attention problems ($b = 0.265$, $p < .001$), and delinquency ($b = 0.255$, $p < .001$).

The adjusted estimates compare the treatment and control groups after weighting by the inverse probability of treatment, which accounts for characteristics that shape children's risk of paternal incarceration. Children exposed to paternal incarceration, compared to otherwise comparable children not exposed, experience more externalizing problems ($b = 0.112$, $p < .05$), attention problems ($b = 0.153$, $p < .01$), and delinquency ($b = 0.099$, $p < .10$). There are no statistically significant differences in children's internalizing problems ($b = 0.062$).

Table 2 Time-varying sample characteristics

Variable	1-year survey		5-year survey		9-year survey	
	M or %	(S.D.)	M or %	(S.D.)	M or %	(S.D.)
Mother relationship status						
Married	29.5%		31.0%		29.3%	
Cohabiting	26.9%		12.8%		8.9%	
Non-residential romantic relationship	10.1%		3.2%		2.1%	
Separated	33.6%		53.0%		59.7%	
Mother new partner	11.7%		26.8%		34.7%	
Father new partner	12.1%		28.4%		5.6%	
Mother relationship quality	3.24	(1.43)	2.94	(1.47)	2.77	(1.47)
Father relationship quality	3.52	(1.28)	3.33	(1.33)	3.09	(1.45)
Mother number of children in household	2.29	(1.31)	2.50	(1.33)	2.66	(1.33)
Mother parent in household	18.8%		11.5%		10.3%	
Mother reports domestic violence	4.6%		3.9%		1.6%	
Mother education						
Less than high school	29.3%		25.4%		22.1%	
High school diploma or GED	28.3%		22.3%		18.8%	
Post-secondary education	42.4%		52.3%		59.1%	
Father education						
Less than high school	30.0%		27.5%		25.4%	
High school diploma or GED	35.7%		31.7%		29.8%	
Post-secondary education	34.3%		40.7%		44.8%	
Mother employment						
Mother employment	54.9%		60.1%		61.6%	
Father employment						
Father employment	75.8%		76.0%		69.5%	
Mother in poverty						
Mother in poverty	42.0%		38.4%		37.9%	
Father in poverty						
Father in poverty	29.9%		27.3%		30.2%	
Mother material hardship	1.18	(1.63)	2.11	(2.27)	1.53	(1.87)
Father material hardship	1.04	(1.59)	1.71	(2.06)	1.42	(1.99)
Mother parenting stress	2.20	(.67)	2.18	(.68)	2.03	(.68)
Father parenting stress	2.10	(.69)	2.09	(.73)	1.93	(.72)
Mother engagement	4.85	(1.51)	4.62	(1.18)	2.72	(.60)
Father engagement	3.45	(2.14)	3.06	(1.87)	1.50	(1.21)
Mother shared responsibility in parenting	2.85	(1.12)	2.46	(1.21)	2.25	(1.19)
Mother cooperation in parenting	3.35	(.93)	3.06	(1.10)	2.85	(1.19)
Mother depression						
Mother depression	15.6%		17.5%		17.7%	
Father depression						
Father depression	12.2%		13.0%		16.5%	
Mother overall health	3.79	(1.04)	3.65	(1.04)	3.55	(1.05)
Father overall health	3.89	(1.04)	3.82	(1.02)	3.70	(1.06)
Mother illicit drug use						
Mother illicit drug use	2.2%		4.1%		6.6%	
Father illicit drug use						
Father illicit drug use	8.4%		10.5%		13.7%	
Mother binge drinking						
Mother binge drinking	7.0%		6.9%		9.0%	
Father binge drinking						
Father binge drinking	27.7%		21.1%		27.2%	
Mother perceived social support	4.04	(1.82)	4.05	(1.88)	4.11	(1.79)
Father perceived social support	4.31	(1.82)	4.31	(1.90)	4.19	(1.87)
Mother residential move	46.3%		50.4%		59.7%	

Table 2 (continued)

Variable	1-year survey		5-year survey		9-year survey	
	M or %	(S.D.)	M or %	(S.D.)	M or %	(S.D.)
Father residential move	45.3%		47.8%		42.8%	
Mother neighborhood disadvantage	0.01	(3.52)	0.01	(3.10)	0.02	(3.10)
Father neighborhood disadvantage	0.18	(3.47)	0.20	(3.10)	0.30	(3.14)
Mother incarcerated	0.7%		8.5%		9.5%	
N	3416					

Table 3 Inverse probability of treatment-weighted estimates of the relationship between paternal incarceration between ages 1 and 15 and adolescent behavior

Outcome variable	Unadjusted		Adjusted	
	<i>b</i>	(SE)	<i>b</i>	(SE)
Internalizing problems	0.122	(.037)	**	0.062 (.042)
Externalizing problems	0.356	(.037)	***	0.112 (.057) *
Attention problems	0.265	(.037)	***	0.153 (.046) **
Delinquency	0.255	(.038)	***	0.099 (.053) ^
N	3416		3416	

All dependent variables are standardized (mean=0, standard deviation=1). Adjusted analyses weighted by the inverse probability of treatment. Coefficients and standard errors are pooled across multiply imputed data sets. ^ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Estimating Adolescent Behavior as a Function of Time-Varying Paternal Incarceration

Table 4 presents estimates of the time-varying relationship between paternal incarceration and adolescent behavior. Panel A examines the consequences of paternal incarceration in early childhood (comparing children who did and did not experience paternal incarceration during this time). The unadjusted estimates show that paternal incarceration in early childhood is associated with more internalizing problems ($b=0.107$, $p < .05$), externalizing problems ($b=0.394$, $p < .001$), attention problems ($b=0.305$, $p < .001$), and delinquency ($b=0.279$, $p < .001$). The adjusted estimates, those that weight by the inverse probability of treatment, show that paternal incarceration in early childhood is associated with more externalizing problems ($b=0.155$, $p < .05$), attention problems ($b=0.172$, $p < .001$), and delinquency ($b=0.121$, $p < .05$). Note that the magnitude of these coefficients is larger than the magnitude of the coefficients of *any* paternal incarceration exposure presented above. The adjusted estimates show no statistically significant differences in internalizing problems ($b=0.041$) in adolescence.⁵

⁵ Additional analyses considered the time-varying consequences of paternal incarceration between the 1- and 3-year surveys and paternal incarceration between the 3- and 5-year surveys, as the data allow for this examination. Adjusted estimates show that paternal incarceration between the 1- and 3-year surveys is significantly associated with more externalizing problems ($b=0.116$), attention problems ($b=0.151$), and delinquency ($b=0.129$) in adolescence. Adjusted estimates, those that exclude children exposed to paternal incarceration between the 1- and 3-year surveys, also show that paternal incarceration between the 3- and

Table 4 Inverse probability of treatment-weighted estimates of the time-varying relationship between paternal incarceration and adolescent behavior

Outcome variable	Unadjusted			Adjusted		
	<i>b</i>	(SE)		<i>b</i>	(SE)	
Panel A. Early childhood (ages 1 to 5)						
Internalizing problems	0.107	(.041)	*	0.041	(.049)	
Externalizing problems	0.394	(.044)	***	0.155	(.060)	*
Attention problems	0.305	(.043)	***	0.172	(.052)	***
Delinquency	0.279	(.044)	***	0.121	(.056)	*
N	3416			3416		
Panel B. Middle childhood (ages 5 to 9)						
Internalizing problems	0.076	(.079)		0.037	(.082)	
Externalizing problems	0.160	(.076)	*	0.024	(.085)	
Attention problems	0.151	(.076)	*	0.061	(.082)	
Delinquency	0.082	(.078)		−0.004	(.082)	
N	2569			2569		
Panel C. Adolescence (ages 9 to 15)						
Internalizing problems	0.015	(.089)		0.049	(.095)	
Externalizing problems	0.236	(.076)	**	0.037	(.093)	
Attention problems	0.100	(.076)		0.063	(.081)	
Delinquency	0.215	(.081)	**	0.122	(.087)	
N	2363			2363		

All dependent variables are standardized (mean=0, standard deviation=1). Adjusted analyses weighted by the inverse probability of treatment. Coefficients and standard errors are pooled across multiply imputed data sets. * $p < .05$, ** $p < .01$, *** $p < .001$

Panel B examines the consequences of paternal incarceration in middle childhood (comparing children who experienced paternal incarceration in middle childhood to children who did not experience paternal incarceration after age one). The unadjusted estimates show that paternal incarceration in middle childhood is positively associated with externalizing problems ($b=0.160$, $p < .05$) and attention problems ($b=0.159$, $p < .05$) in adolescence. These associations decrease in magnitude and fall from statistical significance after weighting by the inverse probability of treatment. Paternal incarceration in middle childhood is not associated with internalizing problems ($b=0.037$), externalizing problems ($b=0.024$), attention problems ($b=0.061$), or delinquency ($b=-0.004$) in adolescence. This suggests that time-varying selection into paternal incarceration in middle childhood accounts for the statistically significant unadjusted differences in adolescent behavior.

Finally, Panel C examines the consequences of paternal incarceration in early adolescence (comparing children who experienced paternal incarceration in adolescence to children who did not experience paternal incarceration after age one). The unadjusted estimates show statistically significant differences in externalizing problems ($b=0.236$, $p < .01$) and

Footnote 5 (continued)

5-year surveys is significantly associated with more externalizing problems ($b=0.203$) and attention problems ($b=0.129$) in adolescence.

delinquency ($b=0.215$, $p<.01$) among adolescents who do and do not experience paternal incarceration. All associations decrease in magnitude and fall from statistical significance after weighting by the inverse probability of treatment (internalizing problems: $b=0.049$; externalizing problems: $b=0.037$; attention problems: $b=0.063$; delinquency: $b=0.122$), again suggesting that time-varying selection into paternal incarceration accounts for the statistically significant unadjusted differences in adolescent behavior.

Supplemental Analyses: Considering Fathers' Earlier Incarceration

The above analyses show that paternal incarceration in early childhood, but not paternal incarceration in middle childhood or adolescence, has deleterious consequences for adolescent behavior. One potential explanation is that the strains of paternal incarceration in early childhood are exacerbated when fathers have an incarceration history, as fathers' earlier incarceration can trigger a cascade of proliferating strains that affect fathers and their families. I estimated the relationship between early childhood paternal incarceration and adolescent behavior for children with and without previously incarcerated fathers. The patterns are inconsistent across outcomes. When fathers have an incarceration history, early childhood paternal incarceration is positively associated with delinquency ($b=0.175$, $p<.05$). When fathers do not have an incarceration history, early childhood paternal incarceration is positively associated with externalizing problems ($b=0.188$, $p<.01$) and attention problems ($b=0.184$, $p<.01$). The differences in coefficients across groups are not statistically significant across all outcomes. These findings should be interpreted cautiously, as they do not rigorously account for time-varying selection into paternal incarceration, but provide suggestive evidence of the importance of considering criminal justice contact across the entire life course.

Supplemental Analyses: Multiple Periods of Exposure to Paternal Incarceration

Another potential related explanation for the primary findings—that exposure to paternal incarceration in early childhood is particularly consequential for adolescent behavior—is that those who experience paternal incarceration in early childhood may experience additional episodes of paternal incarceration in middle childhood or adolescence, and these additional episodes drive the observed relationship between early childhood paternal incarceration and adolescent behavior. I examined this possibility with two sets of supplemental analyses.

First, I excluded adolescents who experience paternal incarceration at more than one of the three time periods ($n=446$). These results are mostly consistent with the main analyses. Adjusted estimates show that paternal incarceration in early childhood is associated with greater externalizing problems ($b=0.137$, $p<.05$) and attention problems ($b=0.151$, $p<.05$) in adolescence. These estimates also show that paternal incarceration in middle childhood and early adolescence is not significantly associated with adolescent behavior. Therefore, these analyses suggest the relationship between paternal incarceration in early childhood and adolescent behavior is not driven by those experiencing paternal incarceration across multiple time periods.

Second, for the estimates of paternal incarceration in middle childhood and early adolescence, I allowed adolescents with previously incarcerated fathers into the reference category. These results show that paternal incarceration in middle childhood is not associated with adolescent behavior, consistent with the main analyses. These results also show that

children who experience paternal incarceration in early adolescence, compared to children who do not experience paternal incarceration in early adolescence, have more externalizing problems ($b=0.119$, $p<.05$), attention problems ($b=0.113$, $p<.05$), and delinquency ($b=0.176$, $p<.01$). Therefore, there is some evidence that multiple episodes of paternal incarceration can be damaging for adolescent behavior when the last exposure occurs in early adolescence, though these supplemental analyses provide a less rigorous causal test than the main analyses.

Supplemental Analyses: Variation Across Father's Pre-incarceration Residential Status

Another potential explanation for the null consequences of paternal incarceration in middle childhood and adolescence is that many children are not living with their fathers by middle childhood or adolescence (and therefore his incarceration would be less consequential [Geller et al. 2012]). I considered this possibility by estimating the time-varying relationship between paternal incarceration and adolescent behavior separately by father's residential status. These analyses show that paternal incarceration in middle childhood and adolescence is not significantly associated with outcomes regardless of father's residential status. For example, among children with residential fathers at the 5-year survey (and therefore immediately prior to the measure of paternal incarceration), paternal incarceration in middle childhood is not significantly associated with internalizing problems ($b=0.079$), externalizing problems ($b=0.087$), attention problems ($b=0.013$), and delinquency ($b=0.114$). Among children with nonresidential fathers, paternal incarceration in middle childhood is also not significantly associated with internalizing problems ($b=0.083$), externalizing problems ($b=0.017$), attention problems ($b=0.154$), or delinquency ($b=-0.089$). The differences across these two subgroups are not statistically significant (Paternoster et al. 1998). The patterns are similar with respect to paternal incarceration exposure in adolescence.⁶

Explaining the Relationship Between Paternal Incarceration and Adolescent Behavior

The above analyses demonstrate the importance of considering the intergenerational consequences of paternal incarceration in a temporal framework. To better understand the long-lasting consequences of paternal incarceration in early childhood for adolescent behavior, I consider five sets of proliferating strains, or mechanisms, that may explain this association: (1) the parental relationship, (2) economic wellbeing, (3) parenting, (4) health, and (5) residence.

First, I consider the relationship between paternal incarceration in early childhood and each of the mechanisms, finding that paternal incarceration in early childhood is independently associated with nearly all of the mechanisms considered (see "Appendix Table 8"). Net of all covariates, paternal incarceration in early childhood is associated with all three measures of the parental relationship (parental separation, mother-reported relationship

⁶ Other supplemental analyses considered race/ethnic and gender heterogeneity in the time-varying consequences of paternal incarceration for adolescent behavior. Findings show that paternal incarceration in early childhood, middle childhood, and early adolescence is similarly associated with adolescent behavior for Whites, Blacks, and Hispanics and for girls and boys.

Table 5 Inverse probability of treatment-weighted estimates of the relationship between paternal incarceration in early childhood and adolescent behavior, with mechanisms

Mechanism	Externalizing problems			Attention problems			Delinquency		
	<i>b</i>	(SE)		<i>b</i>	(SE)		<i>b</i>	(SE)	
Baseline	0.155	(.060)	*	0.172	(.052)	***	0.121	(.056)	*
+ parental relationship	0.122	(.063)	^	0.151	(.054)	**	0.095	(.060)	
+ economic wellbeing	0.127	(.061)	*	0.167	(.053)	**	0.096	(.060)	^
+ parenting	0.130	(.062)	*	0.148	(.148)	**	0.101	(.060)	^
+ health	0.130	(.061)	*	0.153	(.053)	**	0.110	(.057)	^
+ residence	0.142	(.061)	*	0.163	(.052)	**	0.107	(.058)	
+ all	0.120	(.059)*		0.139	(.052)	**	0.090	(.062)	
N	3416			3416			3416		

All dependent variables are standardized (mean = 0, standard deviation = 1). Analyses weighted by the inverse probability of treatment. Coefficients and standard errors are pooled across multiply imputed data sets. ^ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

quality, and father-reported relationship quality). Paternal incarceration is also associated with three measures of economic wellbeing (mother's poverty, father's poverty, and father's material hardship), three measures of parenting (father's engagement, mother's reports of father's shared responsibility in parenting, mother's reports of father's cooperation in parenting), one measure of health (mother's perceived social support), and two measures of residence (mother's residential move and father's residential move).

Table 5 presents results from analyses that explicitly considers these mechanisms. This table only presents coefficients for the three outcomes linked to paternal incarceration in early childhood: externalizing problems, attention problems, and delinquency. These findings demonstrate that changes in the parental relationship following paternal incarceration—measured as parental separation, mother-reported relationship quality, and father-reported relationship quality—explains 21% of the relationship between paternal incarceration in early childhood and externalizing problems (with the coefficient decreasing from 0.155 [$p < .05$] to 0.122 [$p < .10$]), 12% of the relationship between paternal incarceration in early childhood and attention problems (0.172 [$p < .001$] to 0.151 [$p < .01$]), and 21% of the relationship between paternal incarceration in early childhood and delinquency (0.121 [$p < .05$] to 0.095 [*n.s.*]).⁷

Other potential mechanisms—particularly economic wellbeing, parenting, and health—explain a moderate amount of the relationship between paternal incarceration in early childhood and adolescent behavior. For example, economic wellbeing—measured as mother's and father's household income and material hardship—explains 18% of the paternal incarceration coefficient estimating externalizing problems (with the coefficient decreasing from 0.155 [$p < .05$] to 0.127 [$p < .05$]), 3% of the coefficient estimating attention problems (0.172 [$p < .001$] to 0.167 [$p < .01$]), and 21% of the coefficient estimating delinquency (0.121 [$p < .05$] to 0.096 [$p < .10$]). Similarly, parenting explains between 14% and 17% of the association, and health explains between 9% and 16% of the association. Measures of residence explain relatively little of the association (8% for externalizing problems, 5% for attention problems, and 12% for delinquency). In the final model, which includes all potential mechanisms, the relationship between early childhood paternal incarceration and all outcomes is reduced in magnitude, though the estimates of externalizing problems ($b = 0.120$, $p < .05$) and attention problems ($b = 0.139$, $p < .01$) remain statistically significant. The relationship between early childhood paternal incarceration and delinquency is not statistically significant ($b = 0.090$). Sobel-Goodman tests and counterfactual framework mediation analyses document consistent results.

Discussion

Paternal incarceration is an adverse childhood experience that is common among economically disadvantaged children of color. Grounded in theories of strain and stress, research documents mostly detrimental intergenerational consequences of paternal incarceration for behavioral, educational, and health outcomes of children and adolescents (for reviews, see

⁷ I separately considered the three individual measures of the parental relationship in supplemental analyses. Changes in parental separation explains between 9 and 20% (depending on the outcome) of the association between paternal incarceration in early childhood and adolescent behavior, changes in mother-reported relationship quality explains between 12 and 22%, and changes in father-reported relationship quality explains between 7 and 14%.

Foster and Hagan 2015; Johnson and Easterling 2012; Murray et al. 2012; Travis et al. 2014; Turney and Goodsell 2018; Wildeman et al. 2018; Wildeman and Western 2010). Existing research does not consider dynamic selection, the fact that both one's risk of exposure to paternal incarceration and one's reactions to paternal incarceration might vary based on the timing of its occurrence, and often precludes a precise examination of mechanisms. In this article, I draw on general strain theory, a framework commonly used to understand adolescent behavior, and augment it with aspects of the stress process perspective to examine the average and time-varying relationships between paternal incarceration and adolescent behavior and to examine the mechanisms underlying these relationships.

Data from the Fragile Families and Child Wellbeing Study, a cohort of children born in urban areas at the peak of the prison boom, suggest three primary conclusions. First, paternal incarceration—experienced at any point between ages 1 and 15—has deleterious consequences for adolescents' externalizing problems, attention problems, and delinquency. Theoretically, the deleterious consequences of paternal incarceration is consistent with general strain theory. Strains, such as paternal incarceration, can facilitate negative emotions that lead to adolescent behavior problems (Agnew 1992). Empirically, these adverse consequences are consistent with prior research showing paternal incarceration increases behavior problems in early childhood (Geller et al. 2009; Geller et al. 2012; Wildeman 2010) and middle childhood (Haskins 2015; Turney 2017). The findings are also broadly consistent with research documenting paternal incarceration leads to adversities in adolescence including social network disadvantages (Bryan 2017), early sexual onset (Turney and Goldberg 2019), depressive symptoms (Swisher and Roettger 2012), delinquency (Swisher and Roettger 2012; Swisher and Shaw-Smith 2015), and drug use (Roettger et al. 2011). The results also show that paternal incarceration is not associated with adolescents' internalizing problems, following from prior research documenting null effects of paternal incarceration for internalizing behaviors in early childhood (Geller et al. 2012) and depressive symptoms in adolescence (Swisher and Shaw-Smith 2015).

Second, after adjusting for time-stable and time-varying characteristics associated with risk of exposure to paternal incarceration, paternal incarceration in early childhood is associated with externalizing problems, attention problems, and delinquency in adolescence, extending our understanding of the repercussions of paternal incarceration. Importantly, the consequences of paternal incarceration in early childhood are *larger* than the consequences of paternal incarceration at any point through adolescence, highlighting the importance of this time-varying approach. Relatedly, the consequences of paternal incarceration in middle childhood or early adolescence for adolescent behavior results from dynamic selection into paternal incarceration. That is, observed bivariate differences in adolescent outcomes become small and statistically non-significant after accounting for time-varying characteristics associated with exposure to paternal incarceration such as poverty, neighborhood disadvantage, or parental substance use (Giordano et al. 2019; Johnson and Easterling 2012).⁸ Those who first experience paternal incarceration at later points in the life

⁸ Importantly, the comparison group changes over time. The estimates of early childhood paternal incarceration compare children who experience paternal incarceration between ages 1 and 5 to children who do not experience paternal incarceration during this time period. The subsequent analyses compare (1) children who experience paternal incarceration between ages 5 and 9 to children who do not experience paternal incarceration between ages 1 and 9 and (2) children who experience paternal incarceration between ages 9 and 15 to children who do not experience paternal incarceration between ages 1 and 15. Those who first experience paternal incarceration at later points in the life course may be a more select group than those who experience paternal incarceration in early childhood (which, coincidentally, bolsters the findings about the consequences of early childhood paternal incarceration).

course may be a more select group than those who experience paternal incarceration in early childhood (which strengthens the findings about the consequences of early childhood paternal incarceration).⁹

Theoretically, these findings are consistent with general strain theory, as young children may have more difficulties than older children in managing negative emotions emerging from strains. These findings run counter, however, to another component of general strain theory, which suggests that more recently occurring events create more difficulties for adolescents (Agnew 1992). Here it is useful to augment general strain theory with the stress process perspective, a paradigm that posits how stressors unfold in a social context and more explicitly highlights the fundamental importance of timing (Pearlin et al. 1981; Pearlin 1989). Specifically, this framework posits that both one's risk of exposure to stressors and one's reactions to stressors can vary depending on the timing of their occurrence in the life course (Pearlin and Skaff 1996). Early childhood is a critical period in the life course (Entwisle and Alexander 1989). Children exposed to paternal incarceration in early childhood may experience a cascade of accumulating stressors both prior to and after paternal incarceration that contribute to behavior problems in adolescence.

Empirically, these findings depart from the relatively limited prior research that comes to inconsistent findings about the repercussions of paternal incarceration timing. One study, which used the PSID to examine the effects of residential parent incarceration, finds that parental incarceration in both early childhood (ages 0–5) and adolescence (ages 11–16) are linked to internalizing and externalizing behaviors (Johnson 2009; also see Young et al. 2020). Another study, using Add Health, finds that paternal incarceration throughout the life course—including early childhood, middle childhood, and adolescence—is positively associated with adolescent delinquency (Swisher and Shaw-Smith 2015). The current study extends prior research by considering dynamic selection into paternal incarceration and, accordingly, documents the importance of considering paternal incarceration in a temporal framework (Brand and Xie 2007). Further, by showing heterogeneity in the consequences of paternal incarceration by timing of exposure, these findings complement and extend other research documenting heterogeneity in the effects of paternal incarceration (Turanovic et al. 2012; Turney 2017). This temporal framework may be useful for understanding other criminological inquiries such as the association between neighborhood social control and crime, the role of peer influence in adolescent substance abuse, or the effects of felony convictions on employment.

Third, I find that children exposed to paternal incarceration in early childhood experience additional adversities, or proliferating strains and stressors, stemming from their fathers' incarceration, a point consistent with the stress process perspective that suggests stressors produce additional stressors (Umberson et al. 2014). Paternal incarceration triggers adversities that reverberate throughout many aspects of family life, a point that further highlights the importance of augmenting general strain theory with aspects of the stress process perspective (Pearlin et al. 1997). Paternal incarceration makes maintaining romantic relationships difficult (Comfort 2008); reduces fathers' economic contributions to households, creates additional expenses, and alters employment patterns of family members (Western 2006); and decreases fathers' ability to coparent, both while incapacitated and upon release (Turney and Wildeman 2013). These familial strains may independently

⁹ It may also be that paternal incarceration occurring in middle childhood or adolescence is stress-relieving for some families, with offsetting positive and negative consequences of paternal incarceration, a possibility to explore in future research.

endanger negative emotions such as anger. Indeed, general strain theory suggests that anger is critical in understanding the relationship between strains and adolescent behavior. Anger remains unmeasured in the data, but the consideration of this particular pathway (either from paternal incarceration or additional strains stemming from paternal incarceration) is an important direction for future research (Porter and King 2015). Future research may also benefit from considering the time-varying consequences of paternal incarceration for families more generally.

Changes in residence (measured by making a residential move and neighborhood disadvantage) explains a relatively small portion of the relationship between paternal incarceration in early childhood and adolescent behavior. Paternal incarceration triggers residential instability but not a change in neighborhood disadvantage, according to results shown in “Appendix Table 8”, suggesting that families are moving but to similar neighborhoods (Geller and Franklin 2014). It may be that family characteristics—such as parental relationships and parenting—are more important in explaining the consequences of paternal incarceration in early childhood and that neighborhood characteristics take on more importance in middle childhood or adolescence, when youth begin to spend more time in their communities.

Limitations

These analyses provide the first accounting of dynamic selection into paternal incarceration and, accordingly, document the importance of accounting for heterogeneous time-varying processes. However, the results should be interpreted in light of several limitations. First, the analyses cannot account for *unobserved* characteristics that social learning theory suggests might explain the relationship between paternal incarceration and adolescent behavior (Akers 2011). The analyses account for factors that often co-occur with paternal incarceration (including substance use, domestic violence, and impulsivity), but the data exclude information about other types of criminal behavior that immediately preceded the incarceration. Distinguishing the time-varying effect of paternal incarceration from the time-varying effect of other related strains, such as violent behavior or impairments from severe substance abuse, is an important direction for future research. Second, these data necessarily exclude parents’ time-varying experiences prior to the offspring’s birth. A life course approach suggests that prior strains, unmeasured in these data, could be formative in facilitating additional strains; therefore, it would be especially instructive for future data collection efforts to follow the children born to the focal children in the Fragile Families data. Third, though the analyses examine heterogeneity in the timing of paternal incarceration, other types of heterogeneity remain unobserved. For example, the data do not contain precise measures of incarceration duration, incarceration frequency, or reasons for incarceration. Future data collection efforts, perhaps by using linked administrative data, should explore how these forms of heterogeneity may differentially affect adolescent behavior. Finally, though it is unlikely offspring behavior leads to paternal incarceration, future research should simultaneously consider both time-varying treatments and time-varying effects (Wodtke et al. 2016).

Conclusions

The strains of paternal incarceration for adolescents are well documented (Foster and Hagan 2015). This research provides a foundation for integrating general strain theory with

two critical aspects of the stress process perspective, one that highlights the proliferation of stressors and another that highlights the importance of examining the timing of stressors. This research empirically extends existing research on the intergenerational consequences of paternal incarceration by considering dynamic selection into paternal incarceration. Taking into account dynamic selection into paternal incarceration, by adjusting for a host of individual- and family-level characteristics measured immediately prior to paternal incarceration, provides a more careful accounting of the consequences of paternal incarceration than previously considered. It also allows for an examination of time-varying consequences, as paternal incarceration is both shaped by the broader family context and shapes the broader family context, which additionally facilitates a precise investigation of the proliferating stressors linking paternal incarceration to adolescent behavior. Findings suggest paternal incarceration early in the life course is a strain with long-term consequences that extend through adolescence, by facilitating chains of adversity that accumulate throughout early childhood, middle childhood, and adolescence. Given that strains such as paternal incarceration are concentrated among vulnerable groups (Pearlin 1989), the proliferating chains of adversity that both precede and follow paternal incarceration may exacerbate existing inequalities in adolescent behavior.

Acknowledgements This paper benefited from helpful comments from Jessica Hardie and Anita Zuberi. This research was supported by a fellowship from the National Academy of Education (NAEd)/Spencer Foundation, the Foundation for Child Development, and the William T. Grant Foundation. Funding for the Fragile Families and Child Wellbeing Study was provided by the NICHD through Grants R01HD36916, R01HD39135, and R01HD40421, as well as a consortium of private foundations (see <http://www.fragile-families.princeton.edu/funders.asp> for the complete list).

Appendix

See Tables 6, 7 and 8.

Table 6 Sample characteristics, by time-varying paternal incarceration

Time-invariant characteristics	Paternal incarceration in early childhood (ages 1 to 5)		Paternal incarceration in middle childhood (ages 5 to 9)		Paternal incarceration in adolescence (ages 9 to 15)	
	Yes	No	Yes	No	Yes	No
Mother race/ethnicity						
White (non-Hispanic)	14.6%	24.2%	15.8%	24.9%	23.7%	25.0%
Black (non-Hispanic)	62.9%	45.8%	60.2%	44.5%	45.1%	44.5%
Hispanic	19.9%	26.2%	21.1%	26.6%	28.9%	26.5%
Other race (non-Hispanic)	2.6%	3.9%	2.9%	3.9%	2.3%	4.1%
Mother and father a mixed race couple	17.4%	14.0%	14.1%	14.0%	19.1%	13.6%
Mother foreign-born	5.0%	16.1%	4.9%	17.1%	9.8%	17.6%
Father foreign-born	6.4%	17.5%	9.0%	18.2%	13.4%	18.6%
Mother age at first birth	19.680	(3.845)	22.182	(5.482)	20.020	(4.113)
Mother lived with biological parents at age 15	30.9%	45.5%	31.1%	46.7%	36.9%	47.5%
Father lived with biological parents at age 15	30.6%	48.2%	33.6%	49.4%	36.0%	50.5%
Mother cognitive skills	6.534	(2.541)	6.880	(2.698)	6.696	(2.468)
Father cognitive skills	6.169	(2.608)	6.620	(2.789)	6.594	(2.586)
Mother impulsive behaviors	1.604	(.513)	1.498	(.469)	1.572	(.481)
Father impulsive behaviors	2.200	(.715)	1.970	(.673)	2.028	(.705)
Father prior incarceration	50.1%	26.0%	30.6%	25.6%	60.7%	22.9%
Child is boy	53.2%	50.9%	48.5%	51.1%	47.4%	51.4%
Child born low birth weight	10.0%	9.0%	15.0%	8.5%	11.0%	8.3%
Child temperament	3.339	(.790)	3.428	(.764)	3.368	(.776)
Child primary caregiver					3.363	(.762)
Mother	88.0%	88.1%	87.9%	88.2%	93.6%	87.7%

Table 6 (continued)

	Paternal incarceration in early childhood (ages 1 to 5)		Paternal incarceration in middle childhood (ages 5 to 9)		Paternal incarceration in adolescence (ages 9 to 15)		
	Yes	No	Yes	No	Yes	No	
Father	5.0%	7.7%	**	7.8%	6.4%	7.9%	
Other	7.1%	4.2%	**	4.1%	0.0%	4.4%	
Child age	15.571	(.732) 15.591	(.772)	15.529	(.659)	15.630	(.782)
Time-varying characteristics							
Mother relationship status							
Married	10.9%	35.6%	**	22.3%	40.2%	40.6%	
Cohabiting	26.7%	27.0%	**	19.1%	13.4%	9.2%	
Non-residential romantic relationship	16.1%	8.1%	**	3.5%	3.0%	1.5%	
Separated	46.4%	29.3%	**	55.1%	43.5%	48.6%	
Mother new partner	16.6%	10.1%	**	24.2%	22.3%	28.1%	
Father new partner	14.2%	11.4%	**	31.0%	24.6%	5.6%	
Mother relationship quality	2.819	(1.386) 3.379	(1.420)	2.964	(1.350)	3.168	(1.461)
Father relationship quality	3.269	(1.297) 3.608	(1.265)	3.313	(1.276)	3.502	(1.310)
Mother number of children in household	2.441	(1.370) 2.239	(1.282)	2.588	(1.322)	2.460	(1.277)
Mother parent in household	24.6%	16.9%	**	14.0%	9.8%	11.1%	
Mother reports domestic violence	7.4%	3.6%	**	4.4%	2.6%	1.7%	
Mother education							
Less than high school	37.4%	26.6%	**	32.5%	22.4%	19.6%	
High school diploma or GED	30.7%	27.5%	^	24.8%	21.9%	18.6%	
Post-secondary education	31.9%	45.9%	**	42.7%	55.6%	61.8%	

Table 6 (continued)

	Paternal incarceration in early childhood (ages 1 to 5)		Paternal incarceration in middle childhood (ages 5 to 9)		Paternal incarceration in adolescence (ages 9 to 15)	
	Yes	No	Yes	No	Yes	No
Father education						
Less than high school	41.9%	26.1%	31.3%	23.6%	36.0%	20.7%
High school diploma or GED	39.0%	34.6%	40.7%	30.0%	34.7%	27.3%
Post-secondary education	19.0%	39.3%	28.0%	46.4%	29.3%	52.0%
Mother employment	50.4%	56.3%	61.0%	60.8%	54.4%	63.3%
Father employment	57.7%	81.8%	72.9%	83.1%	62.2%	77.7%
Mother in poverty	56.3%	37.4%	46.7%	31.8%	48.0%	30.7%
Father in poverty	45.7%	24.7%	27.9%	20.0%	34.9%	21.8%
Mother material hardship	1.578	(1.827) 1.045	(1.544) ***	(2.281) 1.823	(2.113) ***	(2.000) 1.264
Father material hardship	1.437	(1.789) 0.911	(1.497) ***	(2.057) 1.547	(1.948) ***	(2.294) 1.117
Mother parenting stress	2.253	(.675) 2.183	(.668) **	(.694) 2.151	(.663) *	(.713) 1.988
Father parenting stress	2.175	(.709) 2.075	(.683) ***	(.765) 2.040	(.713) *	(.733) 1.870
Mother engagement	4.870	(1.494) 4.844	(1.515) *	(1.248) 4.603	(1.169) *	(.639) 2.689
Father engagement	3.008	(2.231) 3.598	(2.086) ***	(1.860) 3.257	(1.739) *	(1.167) 1.694
Mother shared responsibility in parenting	2.577	(1.174) 2.938	(1.091) ***	(1.179) 2.661	(1.181) *	(1.117) 2.517
Mother cooperation in parenting	3.190	(.962) 3.396	(.911) ***	(.953) 3.206	(1.051) *	(1.114) 3.078
Mother depression	19.2%	14.4%	18.8%	15.4%	19.1%	15.3%
Father depression	16.3%	10.9%	10.9%	10.3%	20.8%	13.8%
Mother overall health	3.711	(1.075) 3.814	(1.033) *	(1.065) 3.706	(1.017) *	(1.057) 3.621
Father overall health	3.889	(1.063) 3.892	(1.033) *	(1.025) 3.812	(1.017) *	(1.102) 3.737
Mother illicit drug use	3.4%	1.8%	3.9%	3.3%	8.3%	5.5%

Table 6 (continued)

	Paternal incarceration in early childhood (ages 1 to 5)		Paternal incarceration in middle childhood (ages 5 to 9)		Paternal incarceration in adolescence (ages 9 to 15)	
	Yes	No	Yes	No	Yes	No
Father illicit drug use	11.9%	7.2%	12.8%	7.6%	15.5%	10.0%
Mother binge drinking	10.0%	6.0%	9.2%	5.7%	12.9%	7.2%
Father binge drinking	25.8%	28.3%	19.8%	21.6%	31.4%	26.5%
Mother perceived social support	3.583	(1.789)	4.186	(1.799)	3.886	(1.763)
Father perceived social support	3.924	(1.823)	4.433	(1.802)	4.245	(1.836)
Mother residential move	55.5%	43.3%	52.2%	46.4%	69.2%	52.8%
Father residential move	52.3%	43.1%	51.8%	44.6%	49.2%	33.9%
Mother neighborhood disadvantage	0.755	(3.349)	-0.239	(3.540)	0.818	(3.210)
Father neighborhood disadvantage	0.945	(3.342)	-0.079	(3.473)	0.702	(3.125)
Mother incarcerated	1.5%	0.4%	9.7%	6.6%	11.9%	7.0%
N	847	2569	206	2363	173	2190

Time-invariant characteristics measured at baseline (unless otherwise noted in Table 1). Time-varying characteristics for paternal incarceration in early childhood measured at the 1-year survey, for paternal incarceration in middle childhood measured at the 5-year survey, and for paternal incarceration in adolescence measured at the 9-year survey. Estimates of descriptive statistics by paternal incarceration in middle childhood exclude observations exposed to paternal incarceration in early childhood. Estimates of descriptive statistics by paternal incarceration in adolescence exclude observations exposed to paternal incarceration in early childhood or middle childhood. ^ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 7 Logistic regression models estimating propensity of paternal incarceration

Variable	Any paternal incarceration		Paternal incarceration in early childhood		Paternal incarceration in middle childhood		Paternal incarceration in adolescence	
	<i>b</i>	(SE)	<i>b</i>	(SE)	<i>b</i>	(SE)	<i>b</i>	(SE)
Race/ethnicity (reference = White [non-Hispanic])								
Black (non-Hispanic)	0.047	(.137)	0.173	(.154)	0.201	(.264)	-0.650	(.282) *
Hispanic	-0.049	(.146)	0.005	(.165)	0.146	(.277)	-0.163	(.283)
Other race (non-Hispanic)	0.117	(.279)	0.080	(.313)	0.456	(.517)	-0.586	(.603)
Mother and father a mixed race couple	0.376	(.125) **	0.390	(.136) **	0.005	(.247) *	0.322	(.250)
Mother foreign-born	-0.738	(.213) **	-0.850	(.250) ^	-1.181	(.463) *	-0.403	(.424)
Father foreign-born	-0.253	(.199)	-0.498	(.245) *	0.079	(.383) *	0.170	(.398)
Mother age at first birth	-0.039	(.011) **	-0.040	(.013) **	-0.042	(.021)	-0.014	(.023)
Mother lived with biological parents at age 15	-0.153	(.092) ^	-0.091	(.101)	-0.226	(.177)	-0.024	(.194)
Father lived with biological parents at age 15	-0.327	(.102) **	-0.283	(.115) *	-0.268	(.191)	-0.315	(.213)
Mother cognitive skills	0.011	(.018)	-0.002	(.020)	0.122	(.034)	0.042	(.039)
Father cognitive skills	-0.020	(.019)	-0.040	(.021) ^	0.018	(.039)	-0.023	(.042)
Mother impulsive behaviors	0.253	(.093) **	0.188	(.100) ^	0.128	(.176)	0.062	(.211)
Father impulsive behaviors	0.168	(.096) ^	0.213	(.099) *	0.036	(.145)	0.072	(.169)
Father prior incarceration	0.517	(.092) ***	0.336	(.100) **	-0.263	(.178)	1.215	(.189) ***
Child is boy	0.033	(.082)	0.138	(.090)	-0.057	(.155)	-0.146	(.175)
Child born low birth weight	0.064	(.142)	-0.182	(.156)	0.425	(.229) ^	0.102	(.305)
Child temperament	0.028	(.058)	0.027	(.063)	0.083	(.104)	-0.041	(.119)
Mother relationship status (reference = married)								
Cohabiting	0.238	(.131) ^	0.391	(.156) *	0.377	(.257)	0.637	(.321) *
Non-residential romantic relationship	0.577	(.173) **	0.838	(.192) ***	0.011	(.461)	0.704	(.608)
Separated	0.255	(.177)	0.514	(.202) *	0.431	(.314)	0.451	(.402)
Mother new partner	-0.154	(.149)	-0.106	(.158)	-0.340	(.231)	-0.411	(.243) ^
Father new partner	-0.414	(.163) *	-0.430	(.180) *	0.128	(.273)	-0.849	(.608)
Mother relationship quality	-0.145	(.053) **	-0.166	(.055) ***	-0.038	(.094)	-0.270	(.121) *

Table 7 (continued)

Variable	Any paternal incarceration		Paternal incarceration in early childhood		Paternal incarceration in middle childhood		Paternal incarceration in adolescence			
	<i>b</i>	(SE)	<i>b</i>	(SE)	<i>b</i>	(SE)	<i>b</i>	(SE)		
Father relationship quality	0.021	(.051)	0.016	(.053)	-0.026	(.089)	0.087	(.099)		
Mother number of children in household	-0.026	(.034)	-0.022	(.037)	-0.048	(.063)	0.197	(.070)		
Mother parent in household	0.275	(.111)	0.137	(.121)	0.452	(.242)	0.210	(.299)		
Mother reports domestic violence	0.301	(.197)	0.218	(.202)	0.618	(.409)	-0.362	(.676)		
Mother education (reference = less than high school)	-0.015	(.111)	0.043	(.120)	-0.269	(.221)	0.202	(.274)		
High school diploma or GED	-0.177	(.122)	0.068	(.132)	-0.378	(.216)	0.145	(.247)		
Post-secondary education										
Father education (reference = less than high school)										
High school diploma or GED	-0.336	(.106)	-0.335	(.133)	**	-0.039	(.200)	-0.270	(.228)	
Post-secondary education	-0.676	(.126)	-0.567	(.140)	***	-0.585	(.230)	*	-0.745	(.251)
Mother employment	0.078	(.092)	-0.043	(.100)	***	0.232	(.175)	-0.165	(.213)	
Father employment	-0.465	(.124)	-0.607	(.140)	***	-0.275	(.225)	-0.239	(.241)	
Mother in poverty	0.075	(.102)	0.028	(.111)	***	0.262	(.193)	0.063	(.237)	
Father in poverty	0.444	(.106)	0.482	(.113)	***	0.063	(.242)	-0.171	(.262)	
Mother material hardship	0.060	(.044)	0.009	(.046)	*	0.059	(.041)	0.082	(.066)	
Father material hardship	0.022	(.046)	0.098	(.047)	***	0.097	(.050)	0.094	(.063)	
Mother parenting stress	-0.105	(.073)	-0.051	(.074)	***	-0.016	(.128)	-0.047	(.142)	
Father parenting stress	-0.011	(.075)	0.023	(.087)	***	-0.030	(.158)	0.027	(.153)	
Mother engagement	0.034	(.032)	0.057	(.034)	^	0.042	(.072)	0.037	(.164)	
Father engagement	-0.042	(.028)	-0.054	(.029)	^	0.075	(.059)	0.165	(.122)	
Mother shared responsibility in parenting	-0.056	(.073)	-0.060	(.075)	**	0.047	(.139)	-0.115	(.175)	
Mother cooperation in parenting	0.239	(.079)	0.197	(.084)	*	0.189	(.139)	0.220	(.141)	
Mother depression	0.007	(.123)	-0.004	(.132)		0.058	(.234)	-0.140	(.254)	

Table 7 (continued)

Variable	Any paternal incarceration		Paternal incarceration in early childhood		Paternal incarceration in middle childhood		Paternal incarceration in adolescence	
	<i>b</i>	(SE)	<i>b</i>	(SE)	<i>b</i>	(SE)	<i>b</i>	(SE)
Father depression	0.035	(.149)	-0.045	(.169)	-0.181	(.324)	-0.208	(.301)
Mother overall health	0.041	(.043)	0.038	(.047)	-0.084	(.082)	0.084	(.098)
Father overall health	0.108	(.048)	* 0.102	(.051)	* 0.159	(.099)	-0.011	(.102)
Mother illicit drug use	-0.163	(.280)	0.047	(.289)	-0.164	(.420)	0.001	(.369)
Father illicit drug use	0.244	(.164)	0.174	(.181)	0.274	(.303)	-0.048	(.317)
Mother binge drinking	0.396	(.158)	* 0.395	(.167)	* 0.299	(.292)	0.247	(.312)
Father binge drinking	0.092	(.112)	-0.147	(.120)	-0.172	(.236)	0.060	(.218)
Mother perceived social support	-0.016	(.027)	-0.031	(.029)	0.029	(.049)	0.010	(.060)
Father perceived social support	-0.016	(.029)	0.001	(.030)	0.067	(.054)	-0.035	(.063)
Mother residential move	0.167	(.107)	0.172	(.114)	-0.043	(.188)	0.288	(.214)
Father residential move	-0.029	(.109)	0.000	(.124)	0.098	(.199)	0.158	(.248)
Mother neighborhood disadvantage	-0.001	(.021)	-0.012	(.022)	0.042	(.039)	0.004	(.045)
Father neighborhood disadvantage	0.003	(.021)	-0.003	(.022)	-0.038	(.042)	-0.003	(.045)
Mother incarcerated	-0.136	(.477)	0.380	(.470)	0.012	(.282)	0.212	(.297)
Constant	-0.851		-1.408		-3.804		-3.563	
Log likelihood	-1,834		-1,576		-639		-511	
N	3416		3416		2569		2363	

Coefficients and standard errors are pooled across multiply imputed data sets. ^ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 8 Regression models estimating mechanisms as a function of paternal incarceration in early childhood

Outcome variable	Model 1			Model 2		
	<i>b</i>	(SE)		<i>b</i>	(SE)	
Mother and father separated	1.538	(.103)	***	0.968	(.126)	***
Mother relationship quality	−0.818	(.058)	***	−0.329	(.056)	***
Father relationship quality	−0.655	(.064)	***	−0.270	(.065)	***
Mother in poverty	0.780	(.084)	***	0.213	(.107)	*
Father in poverty	1.034	(.084)	***	0.513	(.099)	***
Mother material hardship	0.615	(.076)	***	0.104	(.080)	
Father material hardship	0.695	(.101)	***	0.223	(.107)	*
Mother engagement	0.079	(.024)	***	0.028	(.026)	
Father engagement	−0.604	(.059)	***	−0.314	(.062)	***
Mother shared responsibility in parenting	−0.777	(.046)	***	−0.360	(.044)	***
Mother cooperation in parenting	−0.692	(.047)	***	−0.342	(.045)	***
Mother depression	0.431	(.101)	***	0.125	(.122)	
Father depression	0.504	(.131)	***	0.097	(.160)	
Mother perceived social support	−0.674	(.073)	***	−0.167	(.066)	*
Father perceived social support	−0.681	(.085)	***	−0.109	(.078)	
Mother residential move	0.692	(.088)	***	0.294	(.101)	**
Father residential move	0.949	(.106)	***	0.469	(.124)	***
Mother neighborhood disadvantage	0.886	(.125)	***	−0.010	(.115)	
Father neighborhood disadvantage	0.936	(.140)	***	−0.045	(.128)	

Each row represents a separate dependent variable. Ordinary least squares (OLS) regression models estimate relationship quality, hardship, engagement, shared responsibility in parenting, cooperation in parenting, perceived social support, and neighborhood disadvantage. Logistic regression models estimate separation, poverty, depression, and residential move. Model 1 is unadjusted. Model 2 adjusts for all time-invariant and time-varying control variables. Coefficients and standard errors are pooled across multiply imputed data sets. * $p < .05$, ** $p < .01$, *** $p < .001$

References

- Agnew R (1992) Foundation for a general strain theory of crime and delinquency. *Criminology* 30(1):47–88
- Agnew R (2006) General strain theory: current status and directions for further research. In: Cullen FT, Wright JP, Blevins KR (eds) *Taking stock: the status of criminological theory*. Transaction Publishers, New York, pp 101–123
- Agnew R (2012) Reflection on ‘A revised strain theory of delinquency’. *Soc Forces* 91(1):33–38
- Akers RL (2011) *Social learning and social structure: a general theory of crime and deviance*. Transaction Publishers, New York
- Aseltine RH, Gore S, Gordon J (2000) Life stress, anger and anxiety, and delinquency: an empirical test of general strain theory. *J Health Soc Behav* 41(3):256–275
- Austin PC, Stuart EA (2015) Moving towards best practice when using inverse probability of treatment weighting (IPTW) using the propensity score to estimate causal treatment effects in observational studies. *Stat Med* 34(28):3661–3679
- Baron RM, Kenny DA (1986) The moderator–mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *J Pers Soc Psychol* 51(6):1173–1182
- Besemer S, Van der Geest V, Murray J, Bijleveld CC, Farrington DP (2011) The relationship between parental imprisonment and offspring offending in England and the Netherlands. *Br J Criminol* 51(2):413–437
- Braman D (2004) *Doing time on the outside: incarceration and family life in urban America*. University of Michigan Press, Ann Arbor

- Brand JE, Simon Thomas J (2013) Causal effect heterogeneity. In: Morgan SL (ed) Handbook of causal analysis for social research. Springer, Boston, pp 189–214
- Brand JE, Xie Y (2007) Identification and estimation of causal effects with time-varying treatments and time-varying outcomes. *Sociol Methodol* 37(1):393–434
- Brooks-Gunn J, Duncan GJ (1997) The effects of poverty on children. *Future Child* 7(2):55–71
- Bruns A (2017) Consequences of partner incarceration for women's employment. *J Marriage Fam* 79(5):1331–1352
- Bryan B (2017) Paternal incarceration and adolescent social network disadvantage. *Demography* 54(4):1477–1501
- Burton L (2007) Childhood adultification in economically disadvantaged families: a conceptual model. *Fam Relat* 56(4):329–345
- Carlson MJ (2006) Family structure, father involvement, and adolescent behavioral outcomes. *J Marriage Fam* 68(1):137–154
- Cherlin AJ, Chase-Lansdale PL, McRae C (1998) Effects of parental divorce on mental health throughout the life course. *Am Sociol Rev* 63(2):239–249
- Comfort ML (2008) *Doing time together: forging love and family in the shadow of the prison*. University of Chicago Press, Chicago
- Conger RD, Ge X, Elder GH Jr, Lorenz FO, Simons RL (1994) Economic stress, coercive family process, and developmental problems of adolescents. *Child Dev* 65(2):541–561
- Conger KJ, Conger RD, Scaramella LV (1997) Parents, siblings, psychological control, and adolescent adjustment. *J Adolesc Res* 12(1):113–138
- Crosnoe R, Johnson MK (2011) Research on adolescence in the twenty-first century. *Ann Rev Sociol* 37:439–460
- Dickman SJ (1990) Functional and dysfunctional impulsivity: personality and cognitive correlates. *J Pers Soc Psychol* 58(1):95–102
- Dornbusch SM (1989) The sociology of adolescence. *Ann Rev Sociol* 15(1):233–259
- Duncan GJ, Yeung WJ, Brooks-Gunn J, Smith JR (1998) How much does childhood poverty affect the life chances of children? *Am Sociol Rev* 63(3):406–423
- Dwyer Emory A (2018) Explaining the consequences of paternal incarceration for children's behavioral problems. *Fam Relat* 67(2):302–319
- Elder GH (1998) The life course as developmental theory. *Child Dev* 69(1):1–12
- Elder GH, Johnson MK, Crosnoe R (2003) The emergence and development of life course theory. In: Mortimer JT, Shanahan MJ (eds) *Handbook of the life course*. Springer, Boston, pp 3–19
- Elwert F, Winship C (2014) Endogenous selection bias: the problem of conditioning on a collider variable. *Ann Rev Sociol* 40:31–53
- Entwisle DR, Alexander KL (1989) Early schooling as a "critical period" phenomenon. *Sociol Educ Social* 8:27–55
- Fomby P, Sennott CA (2013) Family structure instability and mobility: the consequences for adolescents' problem behavior. *Soc Sci Res* 42(1):186–201
- Foster H, Hagan J (2007) Incarceration and intergenerational social exclusion. *Soc Probl* 54(4):399–433
- Foster H, Hagan J (2013) Maternal and paternal imprisonment in the stress process. *Soc Sci Res* 42(3):650–669
- Foster H, Hagan J (2015) Punishment regimes and the multilevel effects of parental incarceration: intergenerational, intersectional, and interinstitutional models of social inequality and systemic exclusion. *Ann Rev Sociol* 41:135–158
- Geller A, Curtis MA (2011) A sort of homecoming: incarceration and the housing security of urban men. *Soc Sci Res* 40(4):1196–1213
- Geller A, Franklin AW (2014) Paternal incarceration and the housing security of urban mothers. *J Marriage Fam* 76(2):411–427
- Geller A, Cooper CE, Garfinkel I, Schwartz-Soicher O, Mincy RB (2012) Beyond absenteeism: father incarceration and child development. *Demography* 49(1):49–76
- Geller AB, Garfinkel I, Western B (2009) Incarceration and support for children in fragile families
- Geller A, Jaeger K, Pace GT (2016) Surveys, records, and the study of incarceration in families. *ANNALS Am Acad Political Soc Sci* 665:22–43
- Giordano PC, Copp JE (2015) "Packages" of risk: implications for determining the effect of maternal incarceration on child wellbeing. *Criminol Public Policy* 14(1):157–168
- Giordano PC, Copp JE, Manning WD, Longmore MA (2019) Linking parental incarceration and family dynamics associated with intergenerational transmission: a life-course perspective. *Criminology* 57:395–423
- Goodman SH (2007) Depression in mothers. *Annu Rev Clin Psychol* 3(1):107–135

- Guo G (1998) The timing of the influences of cumulative poverty on children's cognitive ability and achievement. *Soc Forces* 77(1):257–287
- Hagan J, Dinovitzer R (1999) Collateral consequences of imprisonment for children, communities, and prisoners. *Crime Justice* 26:121–162
- Harris A (2016) *A pound of flesh: monetary sanctions as punishment for the poor*. Russell Sage Foundation, New York
- Haskins AR (2014) Unintended consequences: effects of paternal incarceration on child school readiness and later special education placement. *Sociol Sci* 1:141–158
- Haskins AR (2015) Paternal incarceration and child-reported behavioral functioning at age 9. *Soc Sci Res* 52(7):18–33
- Hoffmann JP, Cerbone FG (1999) Stressful life events and delinquency escalation in early adolescence. *Criminology* 37(2):343–374
- Imai K, Keele L, Tingley D (2010) A general approach to causal mediation analysis. *Psychol Methods* 15(4):309–334
- Imbens GW (2000) The role of the propensity score in estimating dose-response functions. *Biometrika* 87(3):706–710
- Johnson R (2009) Ever-increasing levels of parental incarceration and the consequences for children. In: Raphael S, Stoll M (eds) *Do prisons make us safer?*. Russell Sage Foundation, New York, pp 177–206
- Johnson EI, Easterling B (2012) Understanding unique effects of parental incarceration on children: challenges, progress, and recommendations. *J Marriage Fam* 74(2):342–356
- Kessler RC, Andrews G, Mroczek D, Ustun B, Wittchen HU (1998) The World Health Organization composite international diagnostic interview short-form (CIDI-SF). *Int J Methods Psychiatr Res* 7(4):171–185
- King G, Nielsen R (2016) Why propensity scores should not be used for matching. <http://gking.harvard.edu/presentations/why-propensity-scores-should-not-be-used-matching-6>
- Kjellstrand JM, Eddy JM (2011) Parental incarceration during childhood, family context, and youth problem behavior across adolescence. *J Offender Rehabil* 50(1):18–36
- Kort-Butler LA (2017) Health-related strains and subsequent delinquency and marijuana use. *Youth Soc* 49(8):1077–1103
- Kowaleski-Jones L, Duncan GJ (1999) The structure of achievement and behavior across middle childhood. *Child Dev* 70(4):930–943
- Laub JH, Sampson RJ (1993) Turning points in the life course: why change matters to the study of crime. *Criminology* 31(3):301–325
- Leventhal T, Brooks-Gunn, J (2000) The neighborhoods they live in: the effects of neighborhood residence on child and adolescent outcomes. *Psychol Bull* 126(2):309–337
- MacKinnon DP, Warsi G, Dwyer JH (1995) A simulation study of mediated effect measures. *Multivar Behav Res* 30(1):41–62
- Massoglia M, Firebaugh G, Warner C (2013) Racial variation in the effect of incarceration on neighborhood attainment. *Am Sociol Rev* 78(1):142–165
- McLoyd VC (1998) Socioeconomic disadvantage and child development. *Am Psychol* 53(2):185–204
- Mistry RS, Vandewater EA, Huston AC, McLoyd VC (2002) Economic well-being and children's social adjustment: the role of family process in an ethnically diverse low-income sample. *Child Dev* 73(3):935–951
- Moffitt TE, Caspi A (2001) Childhood predictors differentiate life-course persistent and adolescence-limited antisocial pathways among males and females. *Dev Psychopathol* 13(2):355–375
- Murray J, Janson CG, Farrington DP (2007) Crime in adult offspring of prisoners: a cross-national comparison of two longitudinal samples. *Crim Justice Behav* 34(1):133–149
- Murray J, Farrington DP, Sekol I (2012) Children's antisocial behavior, mental health, drug use, and educational performance after parental incarceration: a systematic review and meta-analysis. *Psychol Bull* 138(2):175–210
- Pager D (2003) The mark of a criminal record. *Am J Sociol* 108(5):937–975
- Paternoster R, Mazerolle P (1994) General strain theory and delinquency: a replication and extension. *J Res Crime Delinquency* 31(3):235–263
- Paternoster R, Brame R, Mazerolle P, Piquero A (1998) Using the correct statistical test for the equality of regression coefficients. *Criminology* 36(4):859–866
- Pearlin LI (1989) The sociological study of stress. *J Health Soc Behav* 30(3):241–256
- Pearlin LI (2009) The life course and the stress process: some conceptual comparisons. *J Gerontol B Psychol Sci Soc Sci* 65(2):207–215
- Pearlin LI, Skaff MM (1996) Stress and the life course: a paradigmatic alliance. *The Gerontologist* 36(2):239–247
- Pearlin LI, Menaghan EG, Lieberman MA, Mullan JT (1981) The stress process. *J Health Soc Behav* 22(4):337–356

- Pearlin LI, Aneshensel CS, LeBlanc AJ (1997) The forms and mechanisms of stress proliferation: the case of AIDS caregivers. *J Health Soc Behav* 38(3):223–236
- Piquero NL, Sealock MD (2000) Generalizing general strain theory: an examination of an offending population. *Justice Q* 17(3):449–484
- Piquero NL, Sealock MD (2004) Gender and general strain theory: a preliminary test of Broidy and Agnew's gender/GST hypotheses. *Justice Q* 21(1):125–158
- Porter LC, King RD (2015) Absent fathers or absent variables? A new look at paternal incarceration and delinquency. *J Res Crime Delinquency* 52(3):414–443
- Reichman NE, Teitler JO, Garfinkel I, McLanahan SS (2001) Fragile families: sample and design. *Child Youth Serv Rev* 23(4–5):303–326
- Robins JM (1999) Association, causation, and marginal structural models. *Synthese* 121(1):151–179
- Roettger ME, Boardman JD (2012) Parental incarceration and gender-based risks for increased body mass index: evidence from the National Longitudinal Study of Adolescent Health in the United States. *Am J Epidemiol* 175(7):636–644
- Roettger ME, Swisher RR, Kuhl DC, Chavez J (2011) Paternal incarceration and trajectories of marijuana and other illegal drug use from adolescence into young adulthood: evidence from longitudinal panels of males and females in the United States. *Addiction* 106(1):121–132
- Sampson RJ, Laub JH (1992) Crime and deviance in the life course. *Ann Rev Sociol* 18(1):63–84
- Schnittker J, Massoglia M, Uggen C (2012) Out and down: incarceration and psychiatric disorders. *J Health Soc Behav* 53(4):448–464
- Schwartz-Soicher O, Geller A, Garfinkel I (2011) The effect of paternal incarceration on material hardship. *Soc Serv Rev* 85(3):447–473
- Slocum LA (2010) General strain theory and the development of stressors and substance use over time: an empirical examination. *J Crim Justice* 38(6):1100–1112
- Swisher RR, Roettger ME (2012) Father's incarceration and youth delinquency and depression: examining differences by race and ethnicity. *J Res Adolesc* 22(4):597–603
- Swisher RR, Shaw-Smith UR (2015) Paternal incarceration and adolescent well-being: life course contingencies and other moderators. *J Crim Law Criminol* 104(4):1–29
- Travis J, Western B, Redburn FS (2014) *The growth of incarceration in the United States: exploring causes and consequences*. The National Academies Press, Washington, DC
- Turanovic JJ, Rodriguez N, Pratt TC (2012) The collateral consequences of incarceration revisited: a qualitative analysis of the effects on caregivers of children of incarcerated parents. *Criminology* 50(4):913–959
- Turney K (2014a) Stress proliferation across generations? Examining the relationship between parental incarceration and childhood health. *J Health Soc Behav* 55(3):302–319
- Turney K (2014b) The consequences of paternal incarceration for maternal neglect and harsh parenting. *Soc Forces* 92(4):1607–1636
- Turney K (2014c) The intergenerational consequences of mass incarceration: implications for children's co-residence and contact with grandparents. *Soc Forces* 93(1):299–327
- Turney K (2015a) Liminal men: incarceration and relationship dissolution. *Soc Probl* 62(4):499–528
- Turney K (2015b) Hopelessly devoted? Relationship quality during and after incarceration. *J Marriage Fam* 77(2):480–495
- Turney K (2017) The unequal consequences of mass incarceration for children. *Demography* 54(1):361–389
- Turney K, Goldberg RE (2019) Paternal incarceration and early sexual onset among adolescents. *Popul Res Policy Rev* 38(1):95–123
- Turney K, Goodsell R (2018) Parental incarceration and children's wellbeing. *Future Child* 28(1):147–164
- Turney K, Haskins AR (2014) Falling behind? Children's early grade retention after paternal incarceration. *Sociol Educ* 87(4):241–258
- Turney K, Schnittker J, Wildeman C (2012a) Those they leave behind: paternal incarceration and maternal instrumental support. *J Marriage Fam* 74(5):1149–1165
- Turney K, Wildeman C, Schnittker J (2012b) As fathers and felons: explaining the effects of current and recent incarceration on major depression. *J Health Soc Behav* 53(4):465–481
- Turney K, Wildeman C (2013) Redefining relationships: explaining the countervailing consequences of paternal incarceration for parenting. *Am Sociol Rev* 78(6):949–979
- Umberson D, Williams K, Thomas PA, Liu H, Thomeer MB (2014) Race, gender, and chains of disadvantage: childhood adversity, social relationships, and health. *J Health Soc Behav* 55(1):20–38
- Wakefield S, Powell K (2016) Distinguishing petty offenders from serious criminals in the estimation of family life effects. *ANNALS Am Acad Political Soc Sci* 665(1):195–212
- Wakefield S, Wildeman C (2013) *Children of the prison boom: mass incarceration and the future of American inequality*. Oxford University Press, New York
- Weschler D (1997) *Weschler adult intelligence scale*. The Psychological Corporation, San Antonio

- Western B (2006) *Punishment and inequality in America*. Russell Sage Foundation, New York
- Western B (2018) *Homeward: life in the year after prison*. Russell Sage Foundation, New York
- Western B, Pettit B (2010) Incarceration and social inequality. *Daedalus* 139(3):8–19
- Wheaton B, Gotlib IH (1997) Trajectories and turning points over the life course: concepts and themes. In: Gotlib IH, Wheaton B (eds) *Stress and adversity over the life course: trajectories and turning points*. Cambridge University Press, Cambridge, pp 1–25
- Wildeman C (2009) Parental imprisonment, the prison boom, and the concentration of childhood disadvantage. *Demography* 46(2):265–280
- Wildeman C (2010) Paternal incarceration and children's physically aggressive behaviors: evidence from the Fragile Families and Child Wellbeing Study. *Soc Forces* 89(1):285–309
- Wildeman C, Goldman AW, Turney K (2018) Parental incarceration and child health in the United States. *Epidemiol Rev* 40(1):146–156
- Wildeman C, Western B (2010) Incarceration in Fragile Families. *Future Child* 20(2):157–177
- Wildeman C, Schnittker J, Turney K (2012) Despair by association? The mental health of mothers with children by recently incarcerated fathers. *Am Sociol Rev* 77(2):216–243
- Wodtke GT, Harding DJ, Elwert F (2016) Neighborhood effect heterogeneity by family income and developmental period. *Am J Sociol* 121(4):1168–1222
- Young B, Collier NL, Siennick SE, Mears DP (2020) Incarceration and the life course: age-graded effects of the first parental incarceration experience. *J Dev Life-Course Criminol* 6:256–279

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.