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Stress Proliferation across Generations? Examining the Relationship between Parental Incarceration and Childhood Health

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Abstract

Stress proliferation theory suggests that parental incarceration may have deleterious intergenerational health consequences. In this study, I use data from the 2011–2012 National Survey of Children's Health (NSCH) to estimate the relationship between parental incarceration and children's fair or poor overall health, a range of physical and mental health conditions, activity limitations, and chronic school absence. Descriptive statistics show that children of incarcerated parents are a vulnerable population who experience disadvantages across an array of health outcomes. After adjusting for demographic, socioeconomic, and familial characteristics, I find that parental incarceration is independently associated with learning disabilities, attention deficit disorder and attention deficit hyperactivity disorder, behavioral or conduct problems, developmental delays, and speech or language problems. Taken together, results suggest that children's health disadvantages are an overlooked and unintended consequence of mass incarceration and that incarceration, given its unequal distribution across the population, may have implications for population-level racial-ethnic and social class inequalities in children's health.

Keywords

children's health, National Survey of Children's Health, parental incarceration, stress process theory, stress proliferation

The U.S. incarceration rate has swelled dramatically since the 1970s, mostly resulting from structural factors (e.g., inadequate job prospects for poorly educated men) and the punitive turn in criminal justice policy (e.g., felony convictions for drug crimes, increased sentence lengths) (Wakefield and Uggen 2010). In response, a burgeoning literature documents the mostly negative consequences of incarceration for population health. Although prisoners may encounter some health benefits during incarceration (Patterson 2010; Schnittker and John 2007; Spaulding et al. 2011; although see Fazel and Baillargeon 2011), they also experience chronic medical conditions, infectious diseases, lower self-rated health, increased psychiatric disorders, and a greater risk of mortality upon release (Binswanger et al. 2007; Massoglia 2008a, 2008b; Schnittker and John 2007; Schnittker, Massoglia, and Uggen 2012; Spaulding et al. 2011; Turney, Wildeman, and Schnittker 2012; Wildeman and Muller 2012). Moreover, the negative health consequences of incarceration are not limited to former prisoners, as growing evidence suggests that incarceration also has deleterious mental and physical health consequences for romantic partners and other

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family members of the incarcerated (Lee et al. 2014; Wildeman, Schnittker, and Turney 2012).

Relatively little research has considered the spillover consequences of parental incarceration on children's health, especially children's physical health, despite good reason to believe that the stressors of incarceration, and their corresponding consequences, may proliferate to children of the incarcerated (for research on incarceration's intergenerational consequences for children's behavioral problems and mental health, see, for example, Foster and Hagan 2013; Geller et al. 2012; Murray and Farrington 2008; Wildeman 2010). Indeed, the majority of prisoners have children, and children with incarcerated parents are a sizeable and vulnerable population (Mumola 2000). More than 1.7 million children have a parent in state or federal prison at any given time, which is to say nothing of the additional children who have a parent in jail, and the vast majority of these children are racial-ethnic minorities (Glaze and Maruschak 2008). Further, the cumulative risk of experiencing parental incarceration is especially high for some population groups. For example, among black children of fathers without a high school diploma, about 50% will experience paternal incarceration by age 14, compared with 7% of white children of comparably educated fathers (Wildeman 2009). Incarceration separates parents from households and, in doing so, increases economic insecurity among families (Schwartz-Soicher, Geller, and Garfinkel 2011), strains parental relationships (Lopoo and Western 2005; Massoglia, Remster, and King 2011), impedes parental health (Turney, Wildeman, and Schnittker 2012; Wildeman et al. 2012), and increases parental neglect (Turney 2014), all of which may increase health problems in children.

In this study, I use the stress process paradigm and data from the 2011–2012 National Survey of Children's Health (NSCH), a population-based and representative sample of noninstitutionalized children ages 0 to 17 years in the United States, to estimate the relationship between parental incarceration and children's health. Theoretically, by identifying parental incarceration as a form of stress experienced by parents and by considering how this stress may proliferate to children of the incarcerated, these analyses contribute to the stress process paradigm, which rarely considers children (for an excellent discussion, see Avison 2010). Analytically, although the cross-sectional data preclude causal conclusions, these analyses provide one of the first comprehensive examinations of the relationship between parental incarceration and children's physical and mental health, extending research on the collateral consequences of incarceration for health inequalities and research on the social determinants of children's health. Given that the cumulative risk of exposure to parental incarceration is highest for already disadvantaged poor and minority children, and considering the importance of children's health for intragenerational processes of stratification (Case and Paxson 2010; Haas 2007; Palloni 2006), parental incarceration may exacerbate population-level disparities in children's health and well-being.

BACKGROUND

Theoretical Linkages between Parental Incarceration and Children's Health

Stress process theory provides a useful conceptual framework for understanding why parental incarceration may have deleterious intergenerational health consequences. Generally, this theory suggests that disadvantaged social contexts differentially expose individuals to social stressors that have negative consequences for health (Pearlin 1989). Indeed, incarceration is a social stressor (e.g., Foster 2012; Massoglia 2008a; Turney, Wildeman, and Schnitter 2012) that is differentially endured across social groups. Incarceration is patterned along, among other characteristics, race and social class, with minorities and those with low levels of education more likely to experience incarceration than their counterparts (Wakefield and Uggen 2010). An array of research documents that the incarceration experience is a stressful one (e.g., Sykes [1958] 2007). Inmates have little exposure to individuals outside prison walls, have a restricted and regimented routine, and often face uncertainty about their future. Upon release, former inmates experience additional stressors such as economic uncertainty. Therefore, given that the stressors of incarceration are embedded in the social fabric of individuals' lives, it is common for incarcerated and formerly incarcerated parents to experience multiple stressors simultaneously (Pearlin 1989; Turner and Avison 2003; Wheaton 1994).

Moreover, parental incarceration may be a source of stress proliferation (Pearlin 1989; Pearlin, Aneshensel, and Leblanc 1997). The stress proliferation perspective is most commonly used to explain how the stressors associated with one event (e.g., incarceration) lead to an accumulation of stressors in other life domains (e.g., divorce that results from incarceration). But another aspect of

stress proliferation—the idea that social stressors experienced by one family member can have reverberating and penetrating consequences across generations—has received considerably less empirical attention (Avison 2010; Pearlin et al. 2005; Thoits 2010). In a recent review of the complex relationship between stress and health, Thoits (2010:S45) writes the following: "Stress can proliferate across generations. One of the most important relationships, of course, is that between parents and children. Parents' stressors, particularly the strains of persistent poverty, single parenting, and poor job conditions, and changes such as divorce and intermittent unemployment, represent stressors to children in themselves." Therefore, just as stressors experienced by parents—including, but certainly not limited to, incarceration—can have lasting consequences for their own physical and mental health, these stressors can proliferate across generations and have lasting consequences for the physical and mental health of their children, especially those health outcomes with especially strong stress-related pathways (Thoits 2010; for research on the intergenerational consequences of parental incarceration that uses this perspective, see Foster 2012; Foster and Hagan 2013).

More specifically, a number of stressors experienced by incarcerated parents—and their spouses or romantic partners—might negatively affect the health of their children. These stressors may include the destabilization and diminishing of family finances (Schwartz-Soicher et al. 2011; Western 2002); relationship dissolution (Lopoo and Western 2005; Massoglia et al. 2011) and poor-quality relationships between parents (Turney and Wildeman 2013); increased health problems among both the incarcerated and their romantic partners (Wildeman and Muller 2012); and neglectful parenting behaviors (Turney 2014). Given that economic well-being (Bloom, Cohen, and Freeman 2009; McLeod and Shanahan 1993), social relationships (Angel and Worobey 1988; Harknett 2009; House, Umberson, and Landis 1988), health (Hardie and Landale 2013; Turney 2011), and parenting (Bodovski and Youn 2010) are associated with children's physical and mental health, it is possible that these stressors associated with incarceration lead to health impairments in children.

Although parental incarceration may exert a causal effect on children's health, an alternative possibility is that this relationship stems from parents' selectivity into incarceration. Indeed, both parental incarceration and poor health are disproportionately concentrated among impoverished children, minority children, and those living in disadvantaged neighborhoods. Accordingly, it is quite possible that many of these children would experience health disadvantages regardless of parental incarceration (Bloom, Cohen, and Freeman 2009; Wakefield and Uggen 2010; Wildeman 2009) and that additional markers of disadvantage drive any observed relationship between parental incarceration and children's health.

Empirical Evidence Linking Parental Incarceration and Children's Health

Little research considers the association between parental incarceration and children's health, especially children's physical health. Existing research focusing solely on physical health considers a small number of outcomes and produces inconsistent findings across outcomes. Several studies have examined the relationship between parental incarceration and physical health in *young* children. One study uses both individual- and state-level data to show a positive association between parental incarceration and infant mortality (Wildeman 2012; for other research on birth outcomes, see Martin et al. 1997; Mertens 2001; Siefert and Pimlott 2001). However, other research finds that paternal incarceration is not associated with children's overall health at age 3 years (Geller et al. 2009) or 5 years (Geller et al. 2012). Two additional studies examine the relationship between parental incarceration and physical health in older children. Lee, Fang, and Luo (2013) use representative data from the National Longitudinal Study of Adolescent Health (Add Health) to examine the link between paternal incarceration and an array of health outcomes among offspring who were, on average, 29 years old. The investigators find that parental incarceration is associated with 8 of the 16 health conditions they consider, including high cholesterol, asthma, migraines, HIV/AIDS, and fair or poor overall health (Lee et al. 2013). Roettger and Boardman (2012), also using Add Health, find that parental incarceration is associated with a higher body mass index (BMI) among adult female offspring.

Although research considering the relationship between parental incarceration and children's physical health, especially physical health among nonadult children, is relatively limited and inconsistent, a burgeoning literature finds that parental incarceration is associated with behavioral and mental health problems among children (Geller et al. 2012; Lee et al. 2013; Murray and Farrington 2008; Wakefield and Wildeman 2011; Wilbur et al. 2007; Wildeman 2010; although see Wildeman and

Turney 2014). Furthermore, an adjacent literature documents that parental incarceration is associated with deleterious outcomes beyond health, including educational achievement and attainment (Foster and Hagan 2009; Hagan and Foster 2012; Nichols and Loper 2012; although see Cho 2009, 2011) and delinquency (Aaron and Dallaire 2010; Murray and Farrington 2005; Murray, Loeber, and Pardini 2012; Roettger and Swisher 2011).

The Current Study

In this study I incorporate children into the stress process paradigm (e.g., Avison 2010) to provide one of the first comprehensive examinations of the relationship between parental incarceration and children's health. I first estimate an array of children's health indicators: overall health, 16 specific indicators of physical and mental health (e.g., depression, anxiety, asthma, obesity), disability (measured by activity limitations), and the social consequences of health conditions (measured by chronic school absence). In doing so, I adjust for an array of basic individual- and family-level characteristics, which presents an upper-bound estimate of the association, and an array of possibly endogenous characteristics, which presents a lower-bound estimate of the association. Additionally, because stress process theory suggests that stressors rarely occur in isolation and instead occur contemporaneously (Pearlin 1989; Wheaton 1994), I consider how the health consequences of parental incarceration compare with the health consequences of other types of family stressors (e.g., parental divorce, parental death), an approach used by other research in this area (e.g., Geller et al. 2012; Murray and Farrington 2005).

DATA AND METHODS

For this study I used data from the 2011–2012 National Survey of Children's Health (NSCH), a cross-sectional probability sample of noninstitutionalized children ages 0 to 17 years in the United States. These data provided an excellent opportunity to understand the relationship between parental incarceration and children's health. First, the data were designed to reveal the prevalence and correlates of physical and mental health in children. Second, the large sample ($N = 95{,}677$) meant that enough children experienced parental incarceration and health conditions, some of which are rare in children, to make meaningful statistical comparisons between groups. Finally, the data included a wide array of demographic, socioeconomic, and familial characteristics that made it possible to isolate, to the extent possible with observational data, the association between parental incarceration and children's health.

The 2011–2012 NSCH was conducted by telephone between February 28, 2011, and June 25, 2012. Survey researchers used list-assisted random-digit dialing to identify eligible households—households with children ages 0 to 17 years—that were stratified by state and telephone type (landline or cell phone). Researchers first selected a focal child in each household. Next, an adult respondent, the household member with the most information about the focal child (in about 70% of observations, the child's mother), was interviewed about the focal child. When weighted, the data represented the population of noninstitutionalized 0- to 17-year-old children in the United States. Surveys were primarily administered in English but were also translated into Spanish, Mandarin, Cantonese, Vietnamese, and Korean. The survey completion rate was 54.1% for the landline sample and 41.2% for the cell phone sample. Sampling weights, described in more detail below, were used to adjust for nonresponse, and the resulting nonresponse biases were minimal (Centers for Disease Control and Prevention 2013:4).

Measures

Dependent Variables. The dependent variables included 19 indicators of children's health, all reported by the parent respondent. First, overall health status was measured with a dummy variable indicating whether the child was in fair or poor health. Second, dummy variables indicated the presence of 16 specific physical and mental health conditions. Third, disability was measured with a dummy variable indicating that the child experienced activity limitations because of a medical, behavioral, or other health condition. Fourth, to capture the social consequences of health, a dummy variable indicated chronic school absence, measured affirmatively if illness or injury caused the child to miss school 18 times or more in the past year. This threshold, used in prior research (Chang and Romero 2008; Mehta, Lee, and Ylitalo 2013), was based on missing about 10% of a 180-day school year. See Table 1 for a description of all measures of children's health.

Independent Variable. The independent variable was a dummy variable indicating whether the child ever

Table 1. Measures of Children's Health: National Survey of Children's Health (2011–2012).

Measure	*N*	Age	Description
Overall health			
Fair or poor overall health	95,646	0–17	Child in fair or poor health (compared with excellent, very good, or good health).
Specific conditions			
Learning disability	81,333	3–17	Child currently has learning disability.
ADD or ADHD	85,326	2–17	Child currently has ADD or ADHD.
Depression	85,519	2–17	Child currently has depression.
Anxiety	85,509	2–17	Child currently has anxiety.
Behavioral or conduct problems	85,536	2–17	Child currently has behavioral or conduct problems.
Autism (or related condition)	85,482	2–17	Child currently has autism, Asperger's disorder, pervasive developmental disorder, or other autism spectrum disorder.
Developmental delay	85,496	2–17	Child currently has developmental delays.
Asthma	95,468	0–17	Child currently has asthma.
Obesity	43,864	10–17	Child is currently obese (95% percentile or higher).
Speech or other language problems	85,551	2–17	Child currently has speech or other language problem (includes stuttering or stammering).
Diabetes	95,640	0–17	Child currently has diabetes.
Epilepsy or seizure disorder	95,629	0–17	Child currently has epilepsy or seizure disorder.
Hearing problems	95,582	0–17	Child currently has hearing problems.
Vision problems	95,549	0–17	Child currently has vision problems that cannot be corrected with standard glasses or contact lenses.
Bone, joint, or muscle problems	95,575	0–17	Child currently has bone, joint, or muscle problems.
Brain injury or concussion	95,621	0–17	Child currently has brain injury or concussion.
Disability			
Activity limitation	95,456	0–17	Child is limited or prevented in ability to do things because of medical, behavioral, or other health condition.
Consequences of illness			
Chronic school absence	65,280	6–17	Child missed school day due to illness or injury 18 times or more in the past year.

Note: ADD = attention deficit disorder; ADHD = attention deficit hyperactivity disorder.

lived with a parent or guardian who served time in jail or prison after the child was born. Importantly, this measure of parental incarceration only captures the incarceration of a residential parent, which likely underestimates the percentage of children who experience parental incarceration and the racial disparities in parental incarceration.[1] I considered this in Table 2, which presents the prevalence of parental incarceration among children ages 14 to 17 in the NSCH, which maps nicely onto Wildeman's (2009) demographic estimates of the cumulative risk of parental incarceration by age 14. These descriptive statistics show that in the NSCH, 6.90% of white children and 13.40% of black children experienced the incarceration of a residential parent. By comparison, between 3.60% and 4.20% of white children and between 25.10% and 28.40% of black children experience parental incarceration, according to estimates that consider both residential and nonresidential incarceration (Wildeman 2009:271). Therefore, at least for black children, among whom having nonresidential fathers is common (King, Harris, and

Table 2. Cumulative Risk of Paternal Incarceration, by Race-ethnicity.

	Estimates from 2011–2012 NSCH	Demographic Estimates
Total	8.23%	
White	6.89%	3.60%–4.20%
Black	13.45%	25.10%–28.40%
Hispanic	8.13%	
Other	8.47%	

Note: Cumulative risk of parental incarceration among children in the NSCH is restricted to children ages 14 to 17 years old. Demographic estimates are from Wildeman's (2009) analysis and correspond to 14-year-old children born in 1990.

Heard 2004), considering only residential parent incarceration underestimates the percentage of children who experience parental incarceration.[2] However, it is important to understand the consequences of residential parent incarceration, as the effects of parental incarceration on children are particularly acute for this group.[3]

Control Variables. To isolate the relationship between parental incarceration and children's health, the multivariate analyses considered two sets of control variables. The first set of control variables included the following characteristics that are likely independent of parental incarceration: child age; child female; child born low birth weight; child race (mutually exclusive dummy variables indicating non-Hispanic white, non-Hispanic black, Hispanic, non-Hispanic other race); mother age (mutually exclusive dummy variables indicating ages 20–29, 30–39, 40–49, and 50–59); and parent educational attainment (mutually exclusive dummy variables indicating the highest level of education obtained by either parent: less than high school, high school diploma, more than high school).

The second set of control variables included characteristics that are likely—at least for many children—endogenous to parental incarceration. These characteristics, measured after parental incarceration began, included the following dummy variables: child's parents were biological and married; parent employed; family income difficulties; household member received welfare; household member received WIC; household income below the poverty line; child health insurance (mutually exclusive dummy variables indicating private insurance, public insurance, no insurance); child saw a doctor, nurse, or other healthcare professional in the past year; parent owned home; parent in fair or poor health; household member smoked inside home; and neighborhood was always safe for child. I also included controls for five indicators of adverse family experiences: child lived with a parent or guardian who got divorced after the child was born; child lived with a parent or guardian who died; child ever saw or heard adults in home slap, hit, kick, punch, or beat each other; child lived with anyone who was mentally ill, suicidal, or severely depressed for more than a couple of weeks; and child lived with anyone who had a problem with alcohol or drugs. All models also adjusted for the parent respondent's relationship to the child (mutually exclusive dummy variables indicating mother respondent, father respondent, other respondent).

Statistical Analyses

The analyses, conducted with Stata 13.1, proceeded in three stages. First, chi-square tests were used to estimate statistically significant descriptive differences in children's health between those who did and did not experience parental incarceration. Second, logistic regression models were used to estimate children's health as a function of parental incarceration. The first set of logistic regression models adjusted for a limited set of covariates, those that were likely independent of parental incarceration (e.g., child born low birth weight), and was considered an upper-bound, or liberal, estimate of the association. The second set of logistic regression models adjusted for an extended set of covariates, many of which may have been endogenous characteristics to parental incarceration (e.g., household income below the poverty line). Because the latter likely controls for characteristics that may link parental incarceration to children's health, these values were considered a lower-bound, or conservative, estimate of the association. Finally, I present estimates of how the consequences of parental incarceration compared with the consequences of other adverse family experiences.

The number of missing values varied across dependent variables, mostly because not all dependent variables were ascertained for children of all ages, and, accordingly, the analytic sample varied across outcomes (see Table 1). All but two covariates were missing fewer than 5% of observations. Mother's age and household poverty status were missing 8% and 9% of observations, respectively. All missing covariate values were preserved with multiple imputation. All analyses included sampling weights and corresponding stratum and primary sampling units, which corrected for survey design effects and nonresponse. Therefore, the analyses represent the population of noninstitutionalized children ages 0 to 17 years in the United States.

RESULTS

Sample Description

Table 3 presents weighted descriptive statistics of all variables. First, and consistent with prior research, these descriptive statistics show that children are relatively healthy (Mehta et al. 2013). For example, only 3.15% of children are in fair or poor health. By and large, specific physical and mental health conditions are relatively rare. Among the conditions considered, obesity affects the most children (15.69%). Other commonly experienced health conditions are asthma (8.80%), learning disabilities (8.01%), and attention deficit disorder (ADD) or attention deficit hyperactivity disorder (ADHD) (7.90%). Health-related activity limitations affect 4.94% of the children, and 2.70% have chronic school absence related to injury or illness.

In terms of race-ethnicity, the majority (52.70%) of children are non-Hispanic white, 13.46% are non-Hispanic black, 23.51% are Hispanic, and 10.32% are non-Hispanic other race. More than one-quarter (26.08%) are first- or second-generation immigrants. About one-fifth (21.11%) of children have parents without a high school diploma, 32.48% have at least one parent with a high school diploma, and 46.41% have at least one parent with education beyond high school. More than one-fifth (22.23%) of children live in families with household incomes below the poverty line. The vast majority of children have private (57.22%) or public (37.26%) health insurance, and just 5.52% of children are uninsured. Slightly more than one-tenth (12.32%) of parents are in fair or poor health. Parental divorce, which affects about one-fifth (20.15%) of children, is the most common type of adverse family experience. Further, 7.33% of children have witnessed parental abuse; 8.63% live with a mentally ill, suicidal, or depressed household member; and 10.69% live with a household member with an alcohol or drug problem. Few (3.03%) children have experienced the death of a parent.

Descriptive Differences in Children's Health by Parental Incarceration

Table 4 presents descriptive statistics of children's health, separately for children who did and did not experience parental incarceration. Children who experience parental incarceration, compared with their counterparts, have worse health across all but three outcomes considered. For example, 4.95% of children with incarcerated parents and 3.01% of children without incarcerated parents are in fair or poor overall health ($p < .001$). Children with incarcerated parents have greater rates of specific mental health conditions. They are more than three times as likely to suffer from depression (6.20% for children with incarcerated parents vs. 1.83% for children whose parents are not incarcerated, $p < .001$) or behavioral or conduct problems (10.39% vs. 2.62%, $p < .001$) and at least twice as likely to suffer from learning disabilities (15.29% vs. 7.41%, $p < .001$), ADD/ADHD (18.01% vs. 7.09%, $p < .001$), and anxiety (6.99% vs. 3.06%, $p < .001$). Children with incarcerated parents also have higher rates of physical health conditions such as asthma (14.00% vs. 8.43%, $p < .001$), obesity (21.15% vs. 15.21%, $p < .001$), and speech or language problems (7.37% vs. 4.58%, $p < .001$) as well as higher rates of relatively rare physical health conditions such as epilepsy or seizure disorders (1.30% vs. .61%, $p < .01$), hearing problems (1.93% vs. 1.19%, $p < .01$), vision problems (2.11% vs. 1.26%, $p < .05$), and bone, joint, or muscle problems (3.10% vs. 2.16%, $p < .05$). Parental incarceration is also associated with activity limitations (8.44% vs. 4.69%, $p < .001$) and chronic school absence (3.96% vs. 2.60%, $p < .01$).

Estimating Children's Health as a Function of Parental Incarceration

Main Analyses. Table 5 presents results from logistic regression models estimating children's health as a function of parental incarceration. Each row in Model 1 and Model 2 represents a separate logistic

Table 3. Weighted Descriptive Statistics of All Variables Included in Analyses: National Survey of Children's Health (2011–2012) (N = 95,677).

	%
Outcome variables	
Fair or poor overall health	3.15%
Learning disability	8.01%
ADD or ADHD	7.90%
Depression	2.15%
Anxiety	3.35%
Behavioral or conduct problems	3.18%
Autism (or related condition)	1.80%
Developmental delay	3.56%
Asthma	8.80%
Obesity	15.69%
Speech or other language problems	4.80%
Diabetes	.31%
Epilepsy or seizure disorder	.65%
Hearing problems	1.25%
Vision problems	1.31%
Bone, joint, or muscle problems	2.21%
Brain injury or concussion	.26%
Activity limitation	4.94%
Chronic school absence	2.70%
Independent variable	
Parental incarceration	6.90%
Control variables	
Parent respondent	
Mother	70.01%
Father	24.00%
Other	5.98%
Child age (range: 0–17)	8.59%
Child female	48.86%
Child born low birth weight	9.52%
Child race-ethnicity	
White	52.70%
Black	13.46%
Hispanic	23.51%
Other	10.32%
Child first- or second-generation immigrant	26.08%
Mother age	
20–29 years	18.92%
30–39 years	41.36%
40–49 years	32.15%
50–59 years	7.58%
Parent educational attainment	
Less than high school	21.11%
High school diploma	32.48%
Postsecondary education	46.41%
Parent married to child's biological father	59.24%

(continued)

Table 3. (continued)

	%
Parent employed	84.19%
Family often has difficulty getting by on its income	6.90%
Household member receives welfare	7.30%
Household member receives WIC	14.18%
Household income below the poverty line	22.23%
Child health insurance	
Private insurance	57.22%
Public insurance	37.26%
No insurance	5.52%
Child saw doctor in past year	88.13%
Parent owns home	61.18%
Parent fair or poor health	12.32%
Household member smokes inside home	4.88%
Neighborhood always safe for child	56.62%
Parental divorce or separation	20.15%
Parental death	3.03%
Witness of parental abuse	7.33%
Household member mental health problem	8.63%
Household member drug or alcohol problem	10.69%

Note: ADD = attention deficit disorder; ADHD = attention deficit hyperactivity disorder.

regression model. Only coefficients for parental incarceration are presented for parsimony. In the first model, which adjusts for a limited set of characteristics and provides an upper-bound estimate of the relationship, parental incarceration is significantly and negatively associated with health outcomes. For example, children who experience parental incarceration, compared with their counterparts who do not, have a greater likelihood of being in fair or poor overall health ($b = .435$, odds ratio [OR] = 1.54, $p < .01$). Additionally, parental incarceration is associated with a number of mental (e.g., learning disabilities, ADD/ADHD, depression, anxiety, behavioral or conduct problems, developmental delays) and physical (e.g., asthma, obesity, speech or language problems) health conditions. Parental incarceration is also associated with activity limitations ($b = .416$, OR = 1.52, $p < .001$) and chronic school absence ($b = .309$, OR = 1.36, $p < .05$).

Model 2 adjusts for demographic, socioeconomic, and familial characteristics that may result from the incarceration experience (e.g., marital status, poverty, household member mental health problem) and, thus, provide a lower-bound estimate of the association between parental incarceration and children's health. These conservative models show that parental incarceration is independently associated with a greater likelihood of a learning disability ($b = .201$, OR = 1.22, $p < .01$), ADD/ADHD ($b = .389$, OR = 1.48, $p < .001$), behavioral or conduct problems ($b = .356$, OR = 1.43, $p < .001$), developmental delays ($b = .211$, OR = 1.23, $p < .05$), and speech or language problems ($b = .287$, OR = 1.33, $p < .05$). See Figure 1 for predicted probabilities of children's health.

Model 2 also shows that for seven outcomes (overall health, depression, anxiety, asthma, obesity, activity limitations, and chronic school absence), these endogenous characteristics render the consequences of parental incarceration statistically nonsignificant. Adverse family experiences—including witnessing parental abuse, living with a household member with a mental health problem, and living with a household member with a drug or alcohol problem—are the characteristics that especially reduce the magnitude of the association between parental incarceration and children's health. Other covariates that are important include

Table 4. Frequencies and Chi-square Tests of Children's Health, by Parental Incarceration: National Survey of Children's Health (2011–2012).

	Parental Incarceration	
	Yes	No
Fair or poor overall health	4.95%	3.01%***
Learning disability	15.29%	7.41%***
ADD or ADHD	18.01%	7.09%***
Depression	6.20%	1.83%***
Anxiety	6.99%	3.06%***
Behavioral or conduct problems	10.39%	2.62%***
Autism (or related condition)	2.03%	1.80%
Developmental delay	6.35%	3.33%***
Asthma	14.00%	8.43%***
Obesity	21.15%	15.21%***
Speech or other language problems	7.37%	4.58%***
Diabetes	.31%	.31%
Epilepsy or seizure disorder	1.30%	.61%**
Hearing problems	1.93%	1.19%**
Vision problems	2.11%	1.26%*
Bone, joint, or muscle problems	3.10%	2.16%*
Brain injury or concussion	.42%	.26%
Activity limitation	8.44%	4.69%***
Chronic school absence	3.96%	2.60%**
n	6,592	89,085

Note: Asterisks compare children who did and did not experience parental incarceration. All analyses account for the sampling design. ADD = attention deficit disorder; ADHD = attention deficit hyperactivity disorder.
*$p < .05$, **$p < .01$, ***$p < .001$ (two-tailed tests).

parents' marital status, household poverty, and children's health insurance.[4] It is impossible to know whether these characteristics preceded or followed parental incarceration; therefore, these results should be interpreted cautiously.

Comparing Parental Incarceration to Other Adverse Family Experiences. Table 5 includes only the coefficients for parental incarceration. In Table 6, I present the coefficients for parental incarceration and those for five additional indicators of adverse family experiences: parental divorce or separation; parental death; witness of parental abuse; household member mental health problem; and household member drug or alcohol problem. Each row represents a separate logistic regression model, and the key independent variables are presented across the columns. For ease of interpretation, I present only the five outcomes that are statistically significantly associated with parental incarceration in Model 2 of Table 5. The superscripts indicate that post hoc tests of equality show that the parental incarceration coefficient is statistically different from the other measures of adverse family experiences.

Table 6 shows that across the five outcomes that are significantly related to parental incarceration (learning disabilities, ADD/ADHD, behavioral or conduct problems, developmental delays, and speech or language problems), parental incarceration is, by and large, equally as deleterious as these other adverse family experiences. For example, consider the learning disability outcome. Parental divorce, parental death, witnessing parental abuse, and household member drug or alcohol problem are not associated with children's learning disabilities. Household member mental health problem is associated with a greater likelihood of learning disabilities ($b = .320$, OR = 1.38, $p < .01$), but post hoc tests of equality show that this coefficient is not statistically different from the parental incarceration coefficient.

Table 5. Estimating Children's Health as a Function of Parental Incarceration: National Survey of Children's Health (2011–2012).

	Model 1, Limited Controls		Model 2, Extended Controls	
	b	SE	*b*	SE
Fair or poor overall health	.435	(.140)**	–.106	(.161)
Learning disability	.646	(.088)***	.201	(.101)*
ADD or ADHD	.845	(.089)***	.389	(.105)***
Depression	.967	(.144)***	–.025	(.185)
Anxiety	.734	(.114)***	–.016	(.142)
Behavioral or conduct problems	1.172	(.112)***	.356	(.122)**
Autism (or related condition)	.142	(.190)	–.037	(.210)
Developmental delay	.608	(.113)***	.211	(.111)*
Asthma	.265	(.087)**	.066	(.101)
Obesity	.262	(.109)*	–.026	(.112)
Speech or other language problems	.515	(.118)***	.287	(.133)*
Diabetes	–.235	(.379)	–.252	(.382)
Epilepsy or seizure disorder	.458	(.263)	.091	(.258)
Hearing problems	.226	(.195)	–.279	(.236)
Vision problems	.344	(.286)	–.264	(.332)
Bone, joint, or muscle problems	.203	(.161)	–.239	(.182)
Brain injury or concussion	.226	(.372)	–.150	(.399)
Activity limitation	.416	(.114)***	–.063	(.128)
Chronic school absence	.309	(.155)*	–.262	(.159)

Note: Each row represents a separate dependent variable. Coefficient for parental incarceration presented. Model 1 adjusts for the following: parent respondent, child age, child female, child born low birth weight, child race-ethnicity, child first- or second-generation immigrant, mother age, and parent highest educational attainment. Model 2 adjusts for all variables in Model 1 and the following: parent married to child's biological father, parent employed, family often has difficulty getting by on its income, household member receives welfare, household member receives WIC, household income below the poverty line, child health insurance, child saw doctor in past year, parent owns home, parent in fair or poor health, household member smokes inside home, neighborhood always safe for child, parental divorce or separation, parental death, witness of parental abuse, household member mental health problem, and household member drug or alcohol problem. All analyses account for the sampling design. ADD = attention deficit disorder; ADHD = attention deficit hyperactivity disorder; SE = standard error.
*$p < .05$, **$p < .01$, ***$p < .001$ (two-tailed tests).

Regarding other outcomes, Table 6 shows that parental incarceration, compared with parental divorce, is more strongly associated with both ADD/ADHD and behavioral or conduct problems ($p < .05$) and, compared with parental death, is more strongly associated with ADD/ADHD ($p < .05$). Living with a mentally ill, suicidal, or depressed household member is more negatively associated with behavioral or conduct problems than is parental incarceration ($p < .05$). Additionally, this table documents the deleterious consequences of living with a mentally ill, suicidal, or depressed household member, as this variable is independently, negatively, and significantly associated with all outcomes (as well as 10 of the additional 14 outcomes considered in Table 5, not shown).

DISCUSSION

The increasing incarceration rate in the United States means that an increasing number of children, especially poor and minority children, experience the incarceration of a parent. But despite strong theoretical reasons to believe that the stressors of incarceration, and their consequences, proliferate to offspring of the incarcerated, little research considers this possibility, especially with respect to children's physical health (although see Geller et al. 2009, 2012; Lee et al. 2013; Roettger and Boardman 2012; Wildeman 2012). Therefore, in this article, I use data from the 2011–2012 NSCH, a population-based and representative sample of children ages 0 to 17 years, to incorporate children into the stress process paradigm (Avison 2010) and

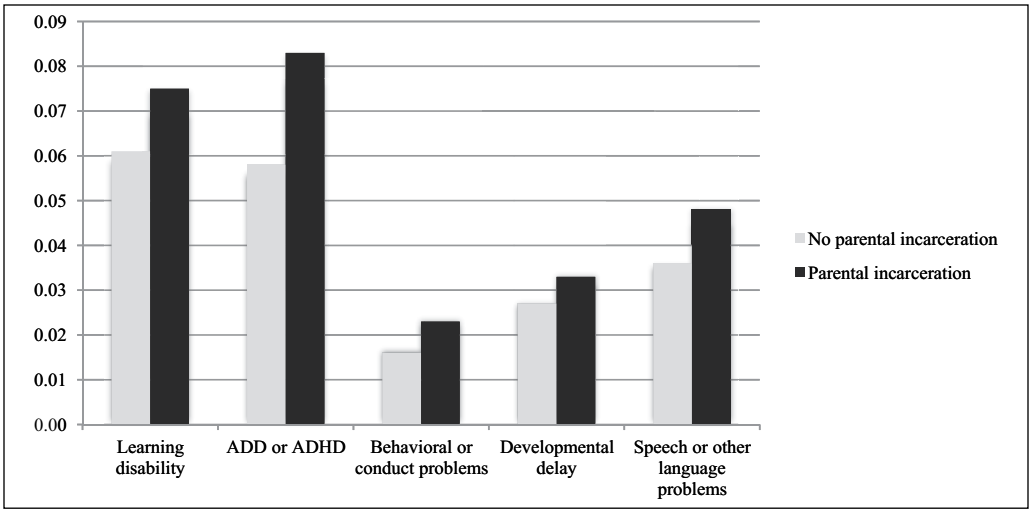

Figure 1. Predicted Probabilities of Children's Health.
Note: Predicted probabilities based on the first imputed data set and Model 2 of Table 5. All values held constant at their mean.

Table 6. Estimating Children's Health as a Function of Parental Incarceration and Adverse Family Experiences: National Survey of Children's Health (2011–2012).

	Parental Incarceration		Parental Divorce or Separation		Parental Death		Witness of Parental Abuse		Household Member Mental Health Problem		Household Member Drug or Alcohol Problem	
	b	SE	*b*	SE	*b*	SE	*b*	SE	*b*	SE	*b*	SE
Learning disability	.201	(.103)*	–.055	(.090)	.211	(.131)	.204	(.107)	.320	(.101)**	–.020	(.097)
ADD or ADHD	.389	(.105)***	.081	(.094)[a]	.030	(.137)[a]	.138	(.103)	.401	(.102)***	.134	(.099)
Behavioral or conduct problems	.356	(.122)**	–.005	(.132)[a]	.257	(.152)	.431	(.128)**	.806	(.147)***[a]	.057	(.122)
Developmental delay	.211	(.111)*	.158	(.121)	.075	(.181)	–.047	(.119)	.444	(.120)***	–.111	(.115)
Speech or other language problems	.287	(.133)*	.044	(.116)	.104	(.179)	.046	(.133)	.404	(.129)**	–.239	(.125)[a]

Note: Each row represents a separate dependent variable. Coefficient for adverse family experiences presented (with all measures of adverse family experiences included in the same model). All models adjust for the following: parent respondent, child age, child female, child born low birth weight, child race-ethnicity, child first- or second-generation immigrant, mother age, parent highest educational attainment, parent married to child's biological father, parent employed, family often has difficulty getting by on its income, household member receives welfare, household member receives WIC, household income below the poverty line, child health insurance, child saw doctor in past year, parent owns home, parent in fair or poor health, household member smokes inside home, and neighborhood always safe for child. All analyses account for the sampling design. ADD = attention deficit disorder; ADHD = attention deficit hyperactivity disorder; SE = standard error.
[a]Coefficient is statistically different from parental incarceration coefficient.
*$p < .05$, **$p < .01$, ***$p < .001$ (two-tailed tests).

to provide one of the first comprehensive descriptive analyses of the collateral consequences of parental incarceration for children's health.

Theoretically, these analyses incorporate children into the stress process paradigm and suggest that incarceration may be a source of intergenerational stress proliferation (Avison 2010; Pearlin 1989; Thoits 2010). The stress process paradigm is commonly invoked to explain the relationship between incarceration and health among the currently and formerly incarcerated (e.g., Massoglia 2008a; Turney, Wildeman, and Schnittker 2012), but is rarely used to consider how the stress of incarceration proliferates to children (for an exception focused on subjective weathering, a concept used to describe when children grow up faster than their peers, see Foster 2012; also see Foster and Hagan 2013). Incarceration, a social stressor disproportionately experienced by disadvantaged groups, may have reverberating and negative consequences for the physical and mental health of the offspring of those who initially experience the stressor. Therefore, not only can incarceration initiate stress among the incarcerated and their romantic partners, as prior research has shown (Lee et al. 2014; Massoglia 2008a; Turney, Wildeman, and Schnittker 2012), it can also trigger and exacerbate stress among their children, which in turn produces deleterious health outcomes.

Empirically, results suggest several conclusions. First, children of incarcerated parents, compared with their counterparts, are a vulnerable population who are disadvantaged across an array of health outcomes. Descriptively, children of incarcerated parents are more likely to experience fair or poor overall health, a range of physical and mental health conditions, activity limitations, and chronic school absence. Multivariate analyses that adjust for demographic, socioeconomic, and familial characteristics show that parental incarceration is independently associated with 5 of the 19 health conditions considered: learning disabilities, ADD/ADHD, behavioral or conduct problems, developmental delays, and speech or language problems. The associations between parental incarceration and other outcomes—such as asthma, obesity, and chronic school absence—are rendered statistically nonsignificant by potential stressors such as marital status, household poverty, and household member mental health problems. Importantly, the cross-sectional data do not allow me to adjudicate between stress-related pathways and other pathways; future research should explicitly consider the mechanisms underlying these associations.

Finally, by and large, parental incarceration is as detrimental for children's health as other types of adverse family experiences such as parental divorce. In a few cases, parental incarceration is more detrimental than other types of adverse family experiences. For example, compared with parental divorce or separation, incarceration is more strongly associated with two outcomes (behavioral or conduct problems and developmental delays), which is consistent with research on children's behavioral problems that finds paternal incarceration is more consequential than other types of father absence (Geller et al. 2012; for research considering how parental incarceration, parental death, and parental separation are differentially associated with children's well-being, see Murray and Farrington 2005). In contrast, living with a mentally ill, suicidal, or depressed household member is more strongly associated with behavioral or conduct problems than is parental incarceration. Interestingly, household member mental health problems are associated with 15 of the 19 indicators of children's health, consistent with other research documenting the relationship between parental mental health and childhood health (e.g., Angel and Worobey 1988; Turney 2011). This is especially noteworthy, as this measure of household member mental health is quite general and, therefore, likely underestimates both the prevalence of mental health problems and the relationship between household member mental health and children's health. Also, these data make it impossible to know whether the relationship between household member mental health problems and children's health results from shared genetics, shared environments, or some combination of the two. Additional research should disentangle these possibilities.

Taken together, these findings augment a burgeoning literature on the collateral consequences of incarceration for children. The robust relationship between parental incarceration and children's mental health is consistent with other research documenting harmful consequences for children's internalizing problems (Murray and Farrington 2008), depressive symptoms (Wilbur et al. 2007), and behavioral problems (Craigie 2011; Johnson 2009; Geller et al. 2012; Wakefield and Wildeman 2011; Wildeman 2010). Additionally, the conservative, lower-bound estimates, which adjust for characteristics likely endogenous to incarceration and show no independent association between parental incarceration and some aspects of children's physical health, are consistent with other research documenting null associations between

incarceration and young children's physical health (Geller et al. 2009, 2012; although, for an examination of infant mortality, see Wildeman 2012). But research on adult children tells a different story, showing that parental incarceration is, indeed, associated with measures of physical health including fair or poor health (Lee et al. 2013), asthma (Lee et al. 2013), and obesity (Roettger and Boardman 2012)—suggesting that health inequalities may emerge over time. Furthermore, these findings have implications for health practitioners. The correlation between parental incarceration and children's health means that physicians serving poor and minority communities may consider screening children for parental incarceration and that social workers in these communities should pay special attention to children's health. Physicians may also consider screening for household mental health problems, as these findings show that children who lived with a mentally ill, suicidal, or depressed household member, compared with their counterparts, experience disadvantages across most health outcomes considered.

Limitations

This study provides one of the first comprehensive examinations of the relationship between parental incarceration and children's health. However, it has a number of limitations. Importantly, similar to much research on incarceration and adult health (see Wildeman and Muller 2012:20), the cross-sectional survey design precludes causal conclusions. An ideal research design would include longitudinal measures of parental incarceration and children's health as well as time-varying demographic, socioeconomic, and familial characteristics associated with selection into incarceration, to facilitate a precise causal estimation of parental incarceration's effects and the mechanisms underlying these effects. In the NSCH data, the measure of parental incarceration occurred temporally prior to the measures of children's health, which is ideal, but also temporally prior to the measurement of all other covariates, which is not ideal. These characteristics (e.g., marital status, poverty, household member mental health) may lead to incarceration or may be stressors resulting from incarceration, but it is not possible to determine whether these characteristics simply confound the relationship between, or are mechanisms linking, parental incarceration and children's health. In many ways, theoretically, the inability to estimate a causal effect of parental incarceration is aligned with the stress process paradigm that highlights the interconnectedness and embeddedness of stressful life events (Pearlin 1989; Wheaton 1994). But causal estimates—including those that adjudicate between stress-related mechanisms and other mechanisms that link parental incarceration to children's health, which may provide insights for social policy discussions—should undoubtedly be a key undertaking for future research on this topic.

There are also limitations regarding the variable measurement and sampling frame used in this study. Importantly, the measure of parental incarceration lacks precision, as the NSCH data only capture whether children *ever* lived with a parent who was incarcerated. Additionally, the measure only captures the incarceration of a residential parent. Although it may be these families that are most affected by parental incarceration (e.g., Turney and Wildeman 2013), this measure, compared with a measure that would include both residential and nonresidential parent incarceration, produces a lower prevalence of parental incarceration and smaller racial disparities in parental incarceration. Furthermore, it is not possible to distinguish between maternal and paternal incarceration, between jail and prison incarceration, the length of parental incarceration, the number of parental incarcerations, the proximity of parental incarceration to the interview, or whether the child had to move households or was placed in foster care as a result of the incarceration. All of these features of the incarceration experience may matter for children's health, and, accordingly, future research on children's health should develop surveys that ascertain more precise information about incarceration. Additionally, in the NSCH, parents report children's health. Although parent-reported health is correlated with doctor reports of health (Case, Lubotsky, and Paxson 2002), an ideal survey design would include parent, doctor, and anthropometric measures of children's health. Finally, because the sampling frame excludes institutionalized children, the sample excludes some of the most disadvantaged children and, therefore, likely produces conservative estimates.

CONCLUSION

Despite this study's limitations, the results provide a crucial foundation for beginning to understand the relationship between parental incarceration and children's health. Children who experience parental incarceration are vulnerable to an array of deleterious health outcomes, some of which persist despite the inclusion of an array of covariates and some of which result from disruptions resulting

from the incarceration experience. These findings extend prior work in the following ways: by incorporating children into the stress process paradigm and providing an empirical test of intergenerational stress proliferation; by considering multiple indicators of children's mental and physical health; and by comparing the consequences of parental incarceration to the consequences of other types of adverse family experiences. Children's health disadvantages may be an overlooked and unintended consequence of mass imprisonment, and the unequal distribution of incarceration across the population suggests that parental incarceration may contribute to racial-ethnic and social class inequalities in children's health that already exist at the population level (Mehta et al. 2013). These inequalities in children's health are especially important given the importance of childhood health for intragenerational processes of stratification throughout the life course (Case and Paxson 2010; Haas 2007; Palloni 2006).

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NOTES

1. This measure of residential parent incarceration is similar to the measure of parental incarceration in the Panel Study of Income Dynamics (PSID) but different from other data sources used to estimate the intergenerational consequences of parental incarceration, including the Fragile Families and Child Well-being Study (FFCWB), the Project on Human Development in Chicago Neighborhoods (PHDCN), the Pregnancy Risk Assessment Monitoring System (PRAMS), and the National Longitudinal Study of Adolescent Health (Add Health).
2. Parental incarceration among white children in the NSCH is more common than in Wildeman's (2009) demographic analysis. This likely results from the fact that the NSCH measure of parental incarceration includes both jail and prison, compared with the demographic analysis that only considers imprisonment (for a discussion of this, see Wildeman 2009:275).
3. Indeed, prior research suggests that the consequences of incarceration on children (e.g., Geller et al. 2012; Johnson 2009) and family life more generally (e.g., Turney and Wildeman 2013) are concentrated among families in which fathers are living with children prior to incarceration.
4. It is possible that the relationship between parental incarceration and outcomes such as activity limitations and chronic school absence varies by specific health conditions (such as depression, behavioral or conduct problems, or obesity). However, supplemental analyses provide no robust support for this possibility.

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