Life Shocks and Crime: A Test of the "Turning Point" Hypothesis

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Abstract

Sampson, Laub, and others have posited that important events in men's lives, such as employment, marriage, and parenthood, strengthen their social ties and lead them to refrain from crime. A challenge in this literature has been the issue of self selection into life transitions. This study contributes to this literature by estimating the effects of an exogenous life shock on crime. We use data from the Fragile Families and Child Wellbeing study augmented with information from hospital medical records to estimate the effects of the birth of a child with a severe but random health problem on the likelihood that the infant's father engages in illegal activities. We conduct a number of auxiliary analyses to examine exogeneity assumptions. We find that having an infant born with a serious health condition increases the likelihood that a father becomes involved with the criminal justice system in the three year period following the birth of the child by 1 to 8 percentage points. The effects are strongest for men with low levels of human capital and weak social bonds before the adverse event occurred. These results provide evidence that life events can cause crime, and as such, support the turning point hypothesis.

Criminal activity is costly to both individuals and society. In the United States, crime resulted in a total loss to victims of almost $16 billion in 2004, and expenditures for police, the criminal judicial system, and corrections exceeded $185 billion in 2003 (Sedgwick 2006). The indirect costs of crime are also substantial. For example, children with imprisoned fathers have high rates of poverty, are more likely to grow up without a father, and are often stigmatized, all of which can limit their future labor market opportunities in the legal sector and increase the likelihood that they, like their fathers before them, will engage in criminal activity (Wildeman 2009).

According to Freeman (1996), crime is an activity of individuals with low legitimate earnings prospects, and "…involvement with the criminal justice system has …become part of normal economic life for many young men." For example, over half of 25- to 34-year old black men who are high school dropouts are either incarcerated, on probation, or on parole (Freeman 1996). Yet, many disadvantaged men do not commit crimes, and between the ages of 25 and 35 many offenders either decrease their level of criminal activity or desist altogether (Kerner 2005).

Sampson, Laub, and others have posited that important events in men's lives, such as employment, marriage, and parenthood, strengthen their social ties and lead them to refrain from crime (e.g., Sampson and Laub 1990). Such "turning points" may explain the observed declines in criminal behavior during the life course. Studies have found empirical evidence consistent with the turning point theory. However, an acknowledged challenge in the literature has been the issue of causality. Life events such as marriage and employment are not random; rather, individuals choose these activities just as they choose to commit crime. Thus, it is difficult to say with any degree of certainty that such events cause changes in criminal behavior.

We exploit a life shock—one that is both random in the population and has been shown to affect ties to both romantic partners and the labor market—to test the turning point hypothesis. Specifically, we use data from the Fragile Families and Child Wellbeing survey that have been augmented with medical records data to estimate the effects of the birth of a child with a severe but random health problem on the likelihood that the infant's father becomes or remains involved in illegal activities. The shocks that we consider are infant health conditions that are considered by the medical community to be random events with poor long-term prognoses. We conduct a number of auxiliary analyses to support our assumption that the conditions in question are, in fact, exogenous.

The study sample consists of relatively young and poor urban men, the very group on the margin for committing crime. We estimate effects of the adverse life shock on crime by the father's level of labor market attachment, education, and other measures of community ties at the time of the birth, hypothesizing that the effects would be stronger for men with weak ties. We also estimate effects by the relationship of the parents at the time of the birth, hypothesizing that men's response to the adverse shock would depend upon the initial level of commitment in the relationship. We consider cohabiting as well as marital relationships, as the former are quite relevant for the population of interest but have rarely been considered in studies of the effects of turning points on criminal behavior.

The findings from this study provide evidence on whether a specific type of random and serious life event affects the propensity of at-risk men to commit crime. As such, it represents a reasonable test of the turning point hypothesis. The findings also contribute to a small but growing literature on the effects of poor child health on family resources.

Background

Pioneering work by Sampson and Laub (1990), Laub and Sampson (1993), Laub, Nagin and Sampson (1998), and Sampson Laub and Wimer (2006) provides a strong theoretical underpinning for examining the impact of adult experiences on crime. The authors posit that life events, such as marriage, parenthood, and work, strengthen an individual's bonds to family and community and reduce criminal activity or divert individuals from a criminal career. Conversely, a weakening of these ties will tend to increase criminal activities. Sampson, Laub and Wimer (2006) recently highlighted the issue of causality as it relates to one of life's important turning points, marriage: "Marriage is not a random event …To the extent that marriage is influenced by self selection, the marriage-crime relationship is spurious (p. 470)." To address this issue, the authors investigated whether marriage reduced crime in a sample of 500 male delinquents born between 1923 and 1930 and followed to age 70 (Sampson, Laub and Wimer 2006). Using an inverse probability of treatment weighting (IPTW) methodology and conducting numerous specification and robustness tests, they found high magnitude (about 40-42%) reductions in crime resulting from marriage. These results suggest that the marriage-crime relationship found in previous studies (e.g., Horney, Osgood and Marshall 1995; Laub, Nagin and Sampson 1998; Laub and Sampson 1993; Sampson and Laub 1990) is not spurious. The authors conclude with caveats. First, although the IPTW approach has advantages, it would be helpful to apply other approaches that do not rely on the same types of assumptions. Second, the sample they studied is not a contemporary one and the findings may therefore not be generalizable to the current cohort of young men who are likely to commit crime.

King, Massoglia and MacMillan (2007) used a propensity score matching methodology to estimate the effect of being married on crime on a national sample (from the National Youth Survey) of men aged 21 to 27 in 1987. They found that married men were less likely than unmarried men to engage in crime, but acknowledged that their technique is not an ideal strategy for addressing the causality issue because it cannot take into account unmeasured differences between individuals that may impact both crime and marriage. In other words, their method is an imperfect substitute for a study that has random assignment of the "treatment."

Two recent analyses used "natural experiment" approaches to investigate causality in the marriage-crime relationship. Edlund et al. (2007) investigated the effects of China's one-child policy on crime using aggregate data for provinces in China between 1988 and 2004. From difference-in-differences models, the authors found that (1) the one-child policy increased the sex ratio in China, so that by 2004 there were about 1.1 males per female in the 16-25 age cohort compared with a ratio of less than 1.06 in 1986, and (2) a .01 increase in the sex ratio increased both violent and property crime rates by about 3%, and (3) the increases in crime are due not only to the relative increase in the male population but also to declining marriage rates among men. Caceres-Delpiano and Giolito (2008) examined the impact of unilateral divorce laws in the United States on state-level aggregate arrest rates between 1965 and 1998. Using difference-in-difference models, the authors found evidence that unilateral divorce laws increased arrests for both violent and property crimes among men aged 20 to 24 years. Thus, both the Edlund et al. and Caceres-Delpiano and Giolito studies found that policies that decrease marriage among men also lead to increases in crime. These two studies show that natural experiments such as policy changes can be used to study the question of whether marriage affects crime. When examining policies over a long period of time, however, other trends could potentially explain some of the

observed relationship. For example, Edlund et al. acknowledged that China experienced dramatic societal changes during their sample period, and Caceres-Delpiano and Golito studied a three decade period in the U.S. that was characterized by multi-faceted societal change. Additionally, evidence from natural experiments tends to be limited in terms of generalizability. For these reasons, additional tests of the turning point hypothesis are warranted.

As discussed by Sampson, Laub and Wimer (2006), a drawback of their own study was the sample of men who were born well before World War II. Recent cohorts of men behave quite differently than this earlier cohort in regard to two important life turning points—marriage and parenthood. In 1970, fewer than 20% of men aged 25 to 29 had never been married; that figure increased to 60% in 2008.[1] According to Edin and Reed (2005), poor men and women are about half as likely as those with incomes three or more times the poverty level to be married. As marriage has declined, non-marital cohabitation has increased. According to the Census Bureau, the ratio of unmarried couple households to 100 married couples increased from 1 in 1970 to 11 in 2008.[2] In 1970, about 10% of all births in the United States were to unmarried women. By 2006, this fraction increased to over one third (38.5%). Recent evidence indicates that a sizeable fraction of parents with non-marital births are in cohabiting relationships; for example, about one half of unmarried women giving birth in urban hospitals in the U.S. were cohabiting with the father of the baby at the time of the birth (McLanahan et al. 2001). These recent trends indicate that the marital dichotomy has become less appropriate than it once was for characterizing partnering among poor young men—those who are at high risk for criminal careers.

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[1] Sources: http://www.census.gov/prod/1/pop/p20-484.pdf and
http://www.census.gov/population/www/socdemo/hh-fam/cps2008.html.
[2] Sources: http://www.census.gov/prod/1/pop/p20-484.pdf and
http://www.census.gov/population/www/socdemo/hh-fam/cps2008.html.

Capaldi, Kim, and Owen (2008) investigated the effect of romantic partner relationship stability on criminal behavior, using a sample of at-risk men from the Oregon Youth Study who were in a partner relationship. They found that relationship stability decreased criminal activity among men with prior arrests, but not among those without prior arrests, and that a measure of the man's attachment to his partner was not associated with changes in his criminal activity. Although this study breaks new ground by considering different dimensions of partnering, it has two key drawbacks. It does not address the causality issue in as rigorous a fashion as the studies described above, and the sample size is small.

Another relevant study estimated the effects of entering marital and cohabiting unions on young adults' substance use. Specifically, Duncan, Wilkerson and England (2006), used the 1979 National Longitudinal Survey of Youth (NLSY) to examine binge drinking, marijuana use, and cigarette smoking before and after relationship formations. They found evidence of significant declines in binge drinking and marijuana use following the formation of marital, but not cohabiting, relationships. That is, the formation of cohabiting unions is less favorably linked to men's behavior than is the formation of marital unions.

In this study, we examine the impact of a life event, the birth of a seriously unhealthy child, on criminal activity in a recent cohort of men who at are high risk for criminal behavior by virtue of their age and socioeconomic status. We exploit our ability to characterize poor child health as an exogenous shock in order to address the causality issue. We know from previous research that fathers of unhealthy children are less likely than fathers of healthy children to live with the child's mother one year after the birth (Reichman, Corman and Noonan 2004). We also know that fathers with unhealthy infants work fewer hours in the legal sector than do fathers with healthy infants (Noonan, Reichman and Corman 2005). In other words, the birth of an unhealthy

child has been shown to have negative effects on relationship and labor market ties. As such, investigating the effects of this life event on fathers' criminal activity represents a credible test of the turning point hypothesis.

Data

We use data from a national longitudinal birth cohort survey that have been linked to medical records of the mother respondents and their newborns. The Fragile Families and Child Wellbeing (FFCWB) survey follows a cohort of parents and their newborn children in 20 large U.S. cities (in 15 states). Births were randomly sampled from 75 hospitals in the 20 cities between 1998 and 2000. By design, approximately three quarters of the interviewed mothers were unmarried. Face-to-face interviews were conducted with 4,898 mothers while they were still in the hospital after giving birth. The infants' fathers were also interviewed shortly thereafter, in the hospital or at another location.[3] Baseline response rates were 86 percent among eligible mothers and 78 percent among eligible fathers (fathers were eligible if the infant's mother completed an interview). Additional data have been collected from the hospital medical records (from the birth) for a sub-sample of 3,684 births in 20 cities (in 15 states).[4] Measures of census tract-level poverty were constructed using the parents' baseline addresses, whether they lived together or apart.

Follow-up interviews were conducted over the telephone when the child was one and three years old. Eighty nine percent of the mothers who completed baseline interviews were re-interviewed when their children were between 12 and 18 months old; 86 percent of mothers who completed baseline interviews were re-interviewed when their children were about 3 years

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[3] The over-sampling of non-marital births solely in urban hospitals resulted in a sample which is, generally, more disadvantaged than the general population. See Reichman et al. (2001) for a description of the research design.
[4] Access to the hospital medical records reflects, to a large part, administrative decisions of the different hospitals rather than decisions on the part of individual respondents to have their records reviewed.

(between 30 and 50 months) old. Of the 3,830 fathers who completed baseline interviews, 82 percent completed one year follow-up interviews. Of the 3,830 fathers, 77 percent completed three year follow-up interviews.[5]

The enhanced FFCWB data are well suited for analyzing the effects of a life shock on the father's criminal activity because they were collected as part of a longitudinal birth cohort study and include: (1) exogenous measures of a serious adverse life shock—the birth of a child with a random and serious health condition; (2) information about the father's criminal activity prior to the shock; (3) information on the father's post-shock criminal activity; and (4) rich data on the father's and family's pre-shock characteristics.

Model

Based on the economic framework pioneered by Becker (1968) and Ehrlich (1973), crime is a function of the expected costs and benefits of engaging in that activity and can be modeled as follows:

(1) Criminal behavior = f (human capital, social capital, criminal justice environment, legal labor market environment, life shock).

Individuals with high levels of human capital (and therefore favorable prospects in the legal labor market) are less likely than those with low levels of human capital to engage in crime. The residential environment is also important; strict criminal justice sanctions deter crime and weak local labor markets increase crime (e.g., Gould, Weinberg and Mustart 2002; Grogger 1998; Mocan and Rees 2005). Based on the sociological literature described earlier, Sickles and Williams (2008) incorporated social capital—ties to community through work and marriage— into the economic model. According to Sampson, Laub and Wimer (2006), there are three ways that social ties can deter (men's) criminal activities. First, they may increase both the opportunity

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[5] Some of the fathers (e.g., those who were incarcerated at the time) completed the follow-up interviews in-person.

cost of serving time and the disutility from engaging in illegal acts (by increasing the quality of time spent outside of prison or jail). Second, they may increase the opportunity cost of time spent in illegal activities (through increased time obligations to family or work). Third, spouses and partners can play a direct role in monitoring the individual's behavior, decreasing his access to illegal activities.

Our key variable of interest is a life shock – the birth of a child in poorer health than was expected – which has been shown to reduce the father's ties to both the child's mother (Reichman, Corman, and Noonan, 2004) and the legal labor market (Noonan, Reichman and Corman, 2005). As such, we would expect the shock to increase the likelihood of criminal behavior, particularly among men who are near the margin for engaging in criminal behavior— those with low levels of human capital, weak social bonds, and a previous record of incarceration (which can affect both human and social capital).

Sample, Measures, and Descriptive Analysis

Fathers were included in the sample no matter which of the survey waves they completed, as long as medical record data were available for that birth and information was available for all analysis variables. Of the 3,684 cases with medical record data, we dropped 63 because the birth was a multiple (which could potentially confound the effects of poor child health), 30 because the father was incarcerated at all 3 survey waves (and therefore could not change incarceration status as a result of the infant health shock), and 151 because the father had not seen the child at least once during the 3 years (and was therefore not connected at all to the family unit), leaving a potential sample of 3,440 fathers.

Mothers provided much of the relevant baseline information (e.g., demographics) for fathers who did not complete baseline interviews. For each of the three survey waves, we include

dummy variables for the father not completing that interview. In general, observations without complete data on all right-hand-side variables were dropped. However, we include a dummy variable for fathers who are missing information on their baseline census tract, whether or not they completed a baseline interview.

Below we describe the measures we use in our analyses, present summary statistics, and point out many salient characteristics of the sample.

Criminal Activity

Our two main outcomes are self-reported measures of whether the father was ever convicted of a crime between the birth of the focal child and three years later, and whether the father was ever incarcerated during that same three year period.[6] For each outcome, we restrict the sample to cases with non-missing data on that measure of criminal activity (both pre- and post-birth), and covariates. Of the 3,440 cases potentially in the sample, 2,604 were used for the analyses of conviction (865 were dropped for missing information on convictions after the child's birth, 15 for missing information on convictions before the birth, and 84 for missing information on one or more covariates), and 2,677 were used for the analyses of incarceration (563 were dropped for missing information on incarceration after the child's birth, 101 for missing information on incarceration before the birth, and 99 for missing information on one or more covariates). Descriptive statistics are presented in Table 1 for the two analysis samples.

In the one and three year follow-up surveys, fathers were asked if they had ever been convicted of a serious crime, and when.[7] We used this information to construct measures of

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[6] Individual-level crime supply models usually rely on (self-reported) survey data since administrative records are rarely linked to individual-level data. Although self-reports may result in underreporting of crime, Lochner and Moretti (2004) found that using incarcerations as a proxy for actual crime and using multiple measures of crime are viable strategies when estimating crime supply models.

[7] The following questions were used from the fathers' follow-up surveys to determine if the father had ever been convicted of a crime after the birth of the child and whether the father had ever been convicted of a crime before the

fathers' post-and pre-birth conviction (we use the latter in multivariate analyses of conviction). As shown in Table 1, 9 percent of the fathers were convicted of at least one crime in the three years following the birth of the child, whereas 19 percent had been convicted of at least one crime before the child was born. These figures suggest a general tapering off of criminal activity among new fathers, but it must be kept in mind that the time period considered before the birth (ever in the past) is longer than the three year post-birth observation window.

In the one and three year follow-up surveys, both fathers and mothers were asked if and when the father had ever been incarcerated. We used information provided by the parents to construct measures of fathers' post-and pre-birth incarceration (we use the latter in multivariate analyses of incarceration).[8] As shown in Table 1, 11 percent of the fathers were incarcerated at some point after the birth of the child and 14 percent had been incarcerated at some time before the child was born. The high rates of both conviction and incarceration reflect the high rates of economic disadvantage in the FFCWB study of urban mostly non-marital births (see Table 1).

Infant health shocks

We exploit the ability to characterize infant health shocks with our data. Unlike most studies that ascertain infant health through survey questions to mothers, we were able to construct measures of poor infant health based on data from hospital medical records (from the birth) as well as maternal reports from the one year follow-up survey of specific child disabilities, such as cerebral palsy, that were likely present at birth. The ideal measure of poor infant health would have two characteristics: It would be unrelated to maternal or paternal

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birth of the child: (1) "Have you ever been convicted of any charges?" (2) "How old were you the first when this happened?" (3) "When was your most recent conviction?"
[8] The incarceration questions asked of fathers in the follow-up surveys were similar to those for conviction (see footnote 7). Questions asked of mothers about the fathers' incarceration history that were similar in structure to those asked of fathers. Additional details about the construction of the both the incarceration and conviction measures are available upon request.

behavior, and it would be associated with long-term morbidity. Thus, it would be a true exogenous shock, as are many congenital conditions. Below and in the Appendix, we describe how we constructed the different measures of poor infant health we use in our analyses. These range from a very strict measure that approximates the ideal measure but characterizes few infants in our sample as unhealthy, to broader measures that yield a greater number of cases with poor infant health, but have other limitations that are noted below. We consider patterns of results across the different measures of poor infant health, and in auxiliary analyses, explore the potential for bias in our estimates.

The first measure of poor infant health—*very severe infant health condition*—coded from the medical records and one-year maternal reports of child disability, is whether the infant had a major abnormal health condition at birth. The coding of abnormal conditions was conducted by an outside pediatric consultant who was directed to identify cases that were severe, unlikely caused by prenatal behavior, had a poor long term prognosis, and in the case of one-year maternal reports, were likely present at birth. Our goal was to capture conditions that are for the most part random (e.g., Down Syndrome, congenital heart malformations), given that the pregnancy resulted in a live birth. This measure most closely matches our criteria for an exogenous health shock. However, extreme conditions were rare: only 2 percent of the children in each of our analysis samples had a *very severe infant health condition* as we have defined it (Table 1).

The second measure of poor infant health—*severe infant health condition*—is very similar to the first measure (*very severe infant health condition*). However, it also includes

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children who were very low birthweight (<1500 grams) but had no severe abnormal conditions.[9]

Very low birthweight is a strong risk factor for a number of serious and long-term child health

conditions (Reichman 2005). Reports of birthweight came from the medical records for over 99

percent of the sample.[10] For the remaining cases, birthweight was ascertained from maternal

baseline reports. Three percent of both analysis samples had a *severe infant health condition* as

we have defined it (Table 1). The advantage of this measure is that it yields a larger number of

cases coded as having poor infant health, all of whom have a high probability of having long-

term health problems. The disadvantage is that it may not be purely random, as very low

birthweight can be related to socioeconomic status and prenatal behaviors (Reichman 2005).

The third is a direct, but broad, measure of poor infant health—whether the infant had a

severe or moderately severe abnormal condition. This measure, which does not take into

consideration birthweight, includes conditions that are most likely unrelated to prenatal behavior,

but may or may not have poor long-term prognoses. We call this measure *any infant health*

condition. Again, the coding was conducted by an outside pediatric consultant who

systematically reviewed the medical record data on infant conditions, as well as data from the

one year interviews on physical disabilities of the child. One-fifth of the children in each of the

analysis samples were coded as having *any infant health condition* as we have defined it (Table

1).

For our fourth measure of poor infant health, we use *low birthweight* (< 2500 grams).

This measure is readily obtained from maternal reports or medical records, but is not very

specific because few moderately low birthweight children (the majority of low birthweight

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[9]All but two of the very low birthweight infants also had moderately severe infant health conditions, which are
defined as conditions unrelated to maternal behavior that may or may not have long-term health consequences.
Examples of conditions considered moderately severe are hydrocephaly and cleft palate.
[10] The correlation of birthweights from the two sources is .98.

children), those weighing between 1500 and 2500 grams, have severe health problems (Reichman 2005). A distinct disadvantage is that it is associated with poverty and prenatal behavior. The value of using low birthweight as a measure of poor infant health is that it is a widely used marker and is comparable across studies. Nine percent of the infants in both analysis samples were *low birthweight* (Table 1). Because this measure is strongly associated with poverty and prenatal behavior, it is likely endogenous. We include it strictly for comparison purposes.

Covariates

We include variables that represent the arguments in Equation 1. First, we include the father's criminal activity prior to the birth, which is related to his human and social capital. Incarceration tends to both improve illegal job skills and erode legal job skills (Freeman 1996), and having a criminal record may limit legal employment options. Raphael (2006) found that previously incarcerated young men are less likely than those who have not been incarcerated to make successful transitions into adulthood—they are more likely to live with their parents as adults, less likely to marry, less likely to be employed, and more likely to have low hourly earnings. Controlling for fathers' pre-birth conviction (in models of conviction) and incarceration (in models of incarceration) allows us to both capture these different starting points and assess changes in criminal activity as a result of the infant health shock.

Second, we include demographic and economic characteristics of the father that are related to his human and social capital (all measured at baseline). We include the father's age (in five year intervals), based on the general pattern of desistance from crime with age discussed earlier, and education (high school graduate and any college, compared to less than high school), current employment, and ever having served in the military, which are measures of work-related

human capital. We include whether the father lived with both of his parents at age 15, as a proxy for social ties and disadvantage during childhood, and the percentage of households in the father's census tract with income under the poverty line, as a proxy for household income as well as for neighborhood conditions. We also include the father's nativity (foreign-born, vs. U.S. born) and race/ethnicity (non-Hispanic black, Hispanic, and other, compared to non-Hispanic white).

Third, we include measures of the parents' baseline relationship status (whether they were married, cohabiting, or living apart) and other measures related to family ties or commitment (length of parental relationship, whether the father visited the mother and baby in the hospital, and previous fertility of each parent). About one quarter of the parents were married at the time of the birth (this was by design). Of those who were unmarried, over half were cohabiting. We include several characteristics of the mother (her age, race/ethnicity, education, and employment status), which may be related to the father's human and social capital. We also include the focal child's gender, as boys are more likely to be in poor health than girls (Verbrugge 1982) and to have involved fathers (Dahl and Moretti 2004).

As indicated earlier, prior research has found effects of criminal justice sanctions, labor market characteristics, and other macro-level variables on crime. In order to control for geographical variations in the probability of arrest, conviction, and incarceration, as well as for other city or state characteristics that may affect criminal behavior and possibly infant health, all models include indicators for the city in which the birth occurred (not shown in tables).

Multivariate Results

Primary Analyses

Probit estimates of the effects of each of the four measures of poor child health on the two different measures of the father's post-birth criminal activity are presented in Table 2. In each cell the probit coefficient appears on top; the standard error, which is corrected for city clustering of observations using the Huber-White method, is in parentheses, and the marginal effect is in brackets.

Three of the measures of poor infant health (*very severe infant health condition, severe infant health condition,* and *low birthweight*) significantly increase the likelihood that the father is convicted (incarcerated) after the birth of the child, by 2 to 8 percentage points controlling for pre-birth conviction (incarceration) and the other covariates. It is noteworthy that the magnitude is greatest for our most stringent measure of poor infant health shocks (*very severe infant health condition*) and lowest for our broadest measure (*any infant health condition*). It is also noteworthy that the marginal effect of *low birthweight* (a less precise measure of poor long-term health than the measures of severe conditions and also the most likely of the four measures to be endogenous) is similar in magnitude to that of *any infant health condition* (which is a less precise measure of poor long-term health than the measures of severe conditions). Overall, these results suggest that the shock of having a seriously unhealthy infant increases the likelihood that the father will be convicted (incarcerated) during the child's early formative years, and that the more severe the health condition the greater the effect.[11]

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[11] Additional specifications (results not shown) that used baseline measures of criminal activity that combined incarcerations and convictions (i.e., incarceration or conviction before the birth), that used follow-up measures of criminal activity that combined incarcerations and convictions, and that used combined measures for both baseline and follow-up criminal activity produced very similar results to those presented here.

Table 3 presents the multivariate results for the first two measures of poor infant health from Table 2.[12] Although the covariate estimates vary somewhat depending on the measure of criminal activity used, they paint a remarkably consistent picture. As expected, having been convicted or incarcerated prior to the child's birth is a strong predictor of being convicted (first two columns) or incarcerated (second two columns) after the birth of the child, as are sociodemographic characteristics and measures of the father's human capital. Fathers who graduated high school or attended at least some college are less likely than those who did not graduate high school to be convicted of or incarcerated for a crime after the child's birth. This result is consistent with findings by Lochner and Moretti (2004) of strong effects of high school completion on incarceration while controlling for the potential endogeneity of education. Fathers who were employed at the time of the child's birth are less likely than those who were not employed to later be convicted of or incarcerated for a crime.

As expected, fathers who were not married to the child's mother at the time of the child's birth were more likely than those who were married to the child's mother to be convicted or incarcerated after the birth of the child. The parents' having other children has inconsistent effects on criminal activity, depending on measure of criminal activity. To explore this further, we included the number of children the father had with other partners and the number of other children the mother had rather than the dichotomous measures and found that the estimated effects of poor child health on crime were insensitive to this specification (results not shown). Thus, we can rule out the possibility that the estimated effects of poor infant health on fathers' criminal activity actually reflect the effects of having more children.

The likelihood that the father was convicted or incarcerated after the birth is negatively associated with his age, which is consistent with the life cycle of criminal activity, discussed

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[12] Covariates estimates for the other four models are virtually identical to those presented.

earlier. It is notable that we find no significant differences between fathers aged 25-39 years and those in their early forties. We find no associations between race/ethnicity and crime in our multivariate models. Immigrant status is strongly and negatively related to incarceration; men who are immigrants are 5 percentage points less likely than native-born fathers to be incarcerated. These results are consistent with those of Butcher and Piehl (1998, 2007), who found that recent immigrants are a select group with lower levels of criminal activity than their non-immigrant peers. Living in a poorer census tract at baseline significantly increases the likelihood of future conviction. We do not find a significant association between neighborhood poverty and incarceration.

Altogether, our results are strong and robust. Holding constant past criminal activity and numerous covariates, the shock of having an infant in poor health increases the likelihood that the father will become convicted and/or incarcerated. The results are consistent across two different but commonly used definitions of involvement with the criminal justice system and are significant for different measures of poor infant health. The pattern across measures of poor infant health is clear and consistent with our prior expectations. The effects are strongest for *very severe abnormal condition*, followed by *severe abnormal condition* and then *any infant health condition.* The results for *low birthweight* are very similar in magnitude to those of the broadest direct measure (*any infant health condition*) and in significance to the measures of severe conditions.

Subgroup analyses

As discussed earlier, we expect that an adverse life shock would have a greater negative impact on crime for individuals who are more at-risk for engaging in criminal activities because of their lower levels of human and social capital. We estimated models of both conviction and

incarceration for those with a low level of education (less than high school), those living in poor

census tracts (tracts with 30% or more of families living below poverty), those with prior

conviction or incarceration, and those who were not employed at baseline. In addition, we

examined the effects for fathers who were not married, fathers who were cohabiting but not

married, and fathers who were neither cohabiting with or married to the mother of the child at the

time of the birth.

The marginal effects of *very severe health condition* or *severe health condition* from

these models are presented in Table 4.[13] Because cell sizes become quite small in many of the

subgroup analyses, the results should not be interpreted as conclusive. Other than variables used

to define the subgroup, we include all of the individual level covariates from Table 3. Because of

small cell sizes, however, we do not include city indicators.

In general, we find evidence consistent with the hypothesis that the effects of the adverse

shocks are stronger for men with lower levels of human and social capital. As expected, the

effects are stronger for unmarried fathers than for the full sample. The effects for unmarried

fathers do not appear to differ by cohabitation status, however. That is, we do not find

compelling evidence that men who cohabit behave like married men. This result is consistent

with findings of Duncan, Wilkerson, and England (2006) of stronger associations between

marriage and substance use than between cohabitation and substance use.

Specification Checks

Our analyses rely on the assumptions that poor infant health causes paternal criminal

behavior (not the other way around) and that our measures of poor infant health are random

shocks. For three of our measures of poor infant health—*very severe infant condition, severe*

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[13] We do not include the *any infant health condition* measure in the subgroup analyses because we did not find significant main effects for this measure.

infant condition, and *any infant condition*—we used an outside pediatric consultant to identify

conditions believed by the medical community to be unrelated to prenatal behavior. *Severe infant*

condition was supplemented with cases of very low birthweight. We explore the possibility that

despite this strategy and our rich set of controls, there remain unobserved factors underlying the

associations between poor infant health and fathers' criminal behavior. Because we cannot

formally test for endogeneity, we explore potential bias in our estimates by conducting and

evaluating the results from a series of supplemental analyses.

Exploring potential endogeneity/reverse causality

One potential explanation of why poor infant health is related to post-birth criminal

activity is that the causality runs in the other direction. We know that pre-birth criminal activity

is highly correlated with post-birth criminal activity. It is possible that the father's pre-birth

criminal behavior caused the mother to experience stress or led her to engage in risky behaviors

while pregnant. Under this scenario, we would expect the father's pre-birth criminal activity to

predict poor infant health. To test this potential alternative explanation, we estimated poor infant

health as a function of pre-birth criminal behavior and the other covariates, using each of the

measures of (pre-birth) criminal activity (conviction or incarceration) and each of the four

measures of poor infant health. These results (not shown) indicate that the father's pre-birth

criminal activity is not associated with our *coded* measures of poor infant health.[14] The

association is, however, positive and significant for low birthweight and the father's

incarceration before the birth, providing our first piece of evidence that the estimates for the

coded measures of poor infant health are capturing random health shocks as intended.

Second, we estimated another set of "reverse models" to assess the direction of causality.

That is, we estimated a set of models predicting pre-birth criminal activity as a function of poor

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[14] Owing to the smaller sample sizes in some equations, we excluded city indicators from these models.

infant health and the other covariates. These results (not shown) indicate significant associations

only for incarceration when using low birthweight as the measure of infant health, providing

additional evidence that our coded measures of poor infant health reflect random shocks.

Third, we explored the possibility that the observed associations between poor infant

health and father's criminal activity reflect behaviors of the mother. Previous research has shown

that two of the most important risky prenatal behaviors related to poor birth outcomes are

smoking and illicit drug use (see Reichman et al. 2008). To explore whether the associations

between poor infant health and father's criminal activity reflect the mother's taste for risk, we re-

ran our probit models using subsamples in which the mother did not smoke cigarettes or use

illicit drugs during pregnancy (see Reichman et al. 2008 for more detail on the construction of

the prenatal smoking and drug use measures). The estimated effects of poor infant health for

fathers who have children with low-risk mothers (not shown) are very similar to those for the full

sample, suggesting that the main estimates are not picking up a mother effect.

Timing of incarceration/conviction relative to arrest

The processing of arrestees through the criminal justice system does not occur

immediately. According to the U.S. Department of Justice (2004), the median length of time

between arrest and sentencing for those convicted of a felony in a state court in 2002 was 184

days.[15] It is possible that some fathers who were convicted or incarcerated after the child was

born had actually committed the crime prior to the birth. To account for this timing issue, we ran

supplemental models for which we re-defined post-birth criminal activity as conviction

(incarceration) one year or more after the birth of the child. We used the one year period because

over three-quarters of felony sentences occur within a year after arrest (U.S. Department of

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[15] We do not know whether the men in our sample were convicted (or incarcerated) for a misdemeanor or for a
felony. We would expect the processing time to be shorter for misdemeanors.

Justice 2004). The marginal effects of poor infant health on post-birth criminal activity in these models (not shown) were very similar to those presented in Table 2.

Conclusion

We found evidence in support of the "turning point" hypothesis. Specifically, we found that an adverse life event, the birth of an infant with a severe and random health problem, increases the likelihood that the child's father will engage in criminal activity. We studied a contemporary population-based sample from a birth cohort study of unmarried parents in large U.S. cities. The fathers thus tended to be poor and uneducated, and therefore at high risk for committing crime. We designed our measures of poor child health to represent random shocks and conducted a number of specification checks to verify that assumption. We found evidence that this particular adverse life event increased the likelihood that the child's father engaged in criminal activity in the three-year period following the birth by 1 to 8 percentage points, and that the effects were strongest for men who had lower levels of human capital and weaker social bonds before the adverse event occurred. These results complement those from recent studies that exploited natural experiments to estimate the effects of marriage on crime (Caceres-Delpiano and Giolito 2008; Edlund et al. 2007).

The findings from this study also contribute to a small but growing literature on the effects of poor child health on family resources by pointing to yet another source of disadvantage borne by seriously unhealthy children and their families. The findings also underscore the interdependence between family members' health and well-being, and the increasing recognition that children affect their families.

We conclude with several caveats. First, the results pertain to men who are fathers and may not be generalizable to all men at risk for committing crime. Young adult men who

transition to fatherhood may respond to life shocks differently than those who do not become fathers. Second, the results may not be generalizable to other types of adverse life shocks. Third, our measures of criminal activity are imperfect; it would have been better to have a precise measure of the number, frequency, and intensity of crimes committed. As far as we know, however, there are no available population-based individual-level data that are linked to measures of actual crime. Fourth, conviction data are available only for fathers who completed at least one follow-up interview; the incarceration sample is broader because mothers could provide the needed data. The fact that the results for incarceration and conviction are quite similar (using the two different samples) suggests that missing data is not a large problem.

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Table 1: Sample Characteristics

	Conviction Sample (N=2,604)	Incarceration Sample (N=2,677)
Father's Criminal Activity		
Convicted After Baseline	.09	
Ever Convicted Before Baseline	.19	
Incarcerated After Baseline		.11
Ever Incarcerated Before Baseline		.14
Child's Characteristics		
Very Severe Infant Health Condition	.02	.02
Severe Infant Health Condition	.03	.03
Any Infant Health Condition	.20	.20
Low Birthweight	.09	.09
Male	.52	.52
Father's Characteristics		
Age 15-19 Years	.08	.08
Age 20-24	.32	.31
Age 25-29	.25	.25
Age 30-34	.18	.18
Age 35-39	.11	.11
High School Graduate	.34	.35
Any College	.32	.33
Employed at Baseline	.81	.81
Non-Hispanic Black	.47	.48
Hispanic	.29	.29
Other Race/Ethnicity	.05	.05
Immigrant	.16	.16
Served in the Military	.10	.10
Did Not Complete Baseline Interview	.08	.10
Did Not Complete 1 Year Interview	.10	.07
Did Not Complete 3 Year Interview	.13	.11
Lived With Both Parents at Age 15	.43	.43
% Below Poverty Census Tract, mean	.18	.18
Missing Census Tract	.06	.07
Mother's Characteristics		
At Least 5 Years Younger Than Father	.26	.26
Different Race/Ethnicity Than Father	.14	.14
Less Educated Than Father	.24	.24
Worked in 2 Years Prior to Birth	.81	.80
Parents' Relationship		
Cohabiting (not married)	.42	.41
Not Cohabiting	.31	.32
Parents Knew Each Other at Least 12 Months	.87	.87
Parents Have Other Children Together	.32	.32
Mother had Child with Another Partner	.33	.33
Father had Child with Another Partner	.30	.30
Father Visited in Hospital	.90	.89

Notes: All figures other than census tract poverty are proportions. All child, father, and relationship characteristics are measured at baseline except father had child with another partner, which was measured at one year.

Table 2: Effects of Poor Infant Health on Subsequent Paternal Conviction and Incarceration

	Coefficient (Standard Error) [Marginal Effect]		
	Conviction (N=2604)		
Child Health			
Very Severe Infant Health Condition	.60** (.26) [.08]		
Severe Infant Health Condition		.43** (.19) [.05]	
Any Infant Health Condition			.13 (.13) [.01]
Low Birthweight			.21* (.12) [.02]
	Incarceration (N=2677)		
Very Severe Infant Health Condition	.56* (.30) [.08]		
Severe Infant Health Condition		.37* (.20) [.04]	
Any Infant Health Condition			.14 (.11) [.01]
Low Birthweight			.14* (.07) [.01]

***significant at 1% level; **significant at 5% level; *significant at 10% level

Each of the 8 probit models summarized in this table includes all of the father characteristics in Table 1, plus city indicators (estimates not shown).

Table 3: Effects of Poor Infant Health on Subsequent Paternal Conviction and Incarceration

	Conviction (N=2604)		Incarceration (N=2677)	
	Coefficient (Standard Error) [Marginal Effect]			
Child Characteristics				
Very Severe Infant Health Condition	.60** (.26) [.08]		.56* (.30) [.08]	
Severe Infant Health Condition		.43** (.19) [.05]		.37* (.20) [.04]
Male Child	-.10 (.08) [-.01]	-.10 (.08) [-.01]	-.07 (.09) [-.01]	-.07 (.09) [-.01]
Father's Characteristics				
Ever Convicted (Incarcerated) Before Birth	1.02*** (.10) [.14]	1.01*** (.10) [.14]	1.05*** (.10) [.17]	1.05*** (.10) [.17]
Age 15 - 19	1.08*** (.28) [.18]	1.09*** (.28) [.19]	.62** (.26) [.08]	.62** (.27) [.08]
Age 20 - 24	.72*** (.20) [.07]	.72*** (.20) [.08]	.43* (.22) [.04]	.43* (.22) [.04]
Age 25 - 29	.25 (.23) [.02]	.26 (.24) [.02]	.33 (.21) [.03]	.33 (.21) [.03]
Age 30 - 34	.09 (.26) [.01]	.10 (.26) [.01]	.14 (.16) [.01]	.14 (.16) [.01]
Age 35 - 39	-.16 (.32) [-.01]	-.14 (.32) [-.01]	-.20 (.21) [-.02]	-.20 (.21) [-02]
High School Graduate	-.21** (.10) [-.02]	-.21* (.11) [-.02]	-.37*** (.10) [-.03]	-.37*** (.10) [-.03]
Any College	-.42** (.18) [-.03]	-.42** (.18) [-.03]	-.57*** (.15) [-.04]	-.57*** (.15) [-.04]
Employed at Baseline	-.26*** (.08) [-.02]	-.26*** (.08) [-.02]	-.35*** (.08) [-.04]	-.35*** (.08) [-.04]

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Table 3 (cont'd)

	Conviction		Incarceration	
	Coefficient (Standard Error) [Marginal Effect]			
Father's Characteristics (cont'd)				
Non-Hispanic Black	-.10 (.14) [-.01]	-.10 (.14) [-.01]	.11 (.14) [.01]	.11 (.14) [.01]
Hispanic	-.18 (.14) [-.01]	-.19 (.14) [-.01]	-.07 (.16) [-.01]	-.07 (.16) [-.01]
Other Race/Ethnicity	.23 (.20) [.02]	.23 (.19) [.02]	.23 (.16) [.02]	.23 (.15) [.02]
Immigrant	-.20 (.12) [-.01]	-.20 (.12) [-.01]	-.74*** (.14) [-.04]	-.73*** (.14) [-.04]
Served in the Military	-.11 (.22) [-.01]	-.11 (.22) [-.01]	-.13 (.16) [-.01]	-.13 (.15) [-.01]
Did Not Complete 1 Year Interview	.45*** (.13) [.05]	.46*** (.13) [.05]	.67*** (.15) [.09]	.68*** (.15) [.10]
Did Not Complete 3 Year Interview	-.35** (.16) [-.02]	-.34** (.15) [-.02]	-.22* (.12) [-.02]	-.21* (.12) [-.02]
Did Not Complete Baseline Interview	-.05 (.11) [-.00]	-.05 (.11) [-.00]	.10 (.12) [.01]	.10 (.13) [.01]
Lived with Both Parents at Age 15	-.15 (.10) [-.01]	-.14 (.10) [-.01]	-.18** (.08) [-.02]	-.17** (.08) [-.02]
% Below Poverty Census Tract, mean	.58** (.29) [.05]	.58** (.29) [.05]	.09 (.31) [.01]	.10 (.31) [.01]
Missing Census Tract	.06 (.16) [.01]	.05 (.15) [.00]	-.03 (.17) [-.00]	-.05 (.17) [-.00]
Mother's Characteristics				
At Least 5 Years Younger Than Father	.11 (.16) [.01]	.11 (.15) [.01]	.00 (.16) [.00]	.00 (.16) [.00]

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Table 3 (cont'd)

Mother's Characteristics (cont.)	Conviction		Incarceration	
	Coefficient (Standard Error) [Marginal Effect]			
Different Race/Ethnicity Than Father	.02	.02	-.03	-.03
	(.12)	(.12)	(.13)	(.12)
	[.00]	[.00]	[-.00]	[-.00]
Less Educated Than Father	.27**	.26**	.38***	.38***
	(.11)	(.11)	(.11)	(.11)
	[.02]	[.02]	[.04]	[.04]
Worked in 2 Years Prior to Birth	.05	.05	.02	.02
	(.17)	(.17)	(.15)	(.15)
	[.00]	[.00]	[.00]	[.00]
Parents' Relationship				
Cohabiting (not married)	.42***	.41***	.83***	.82***
	(.15)	(.15)	(.16)	(.16)
	[.04]	[.04]	[.09]	[.09]
Not Cohabiting	.44***	.43***	.84***	.84***
	(.15)	(.15)	(.14)	(.14)
	[.04]	[.04]	[.10]	[.10]
Knew Each Other at Least 12 Months	.05	.05	.00	.00
	(.13)	(.13)	(.08)	(.08)
	[.00]	[.00]	[.00]	[.00]
Had Other Children Together	.13	.13	.12**	.12**
	(.09)	(.09)	(.06)	(.06)
	[.01]	[.01]	[.01]	[.01]
Mother had Child with Another Partner	.18**	.18**	.11	.11
	(.09)	(.09)	(.08)	(.08)
	[.02]	[.02]	[.01]	[.01]
Father had Child with Another Partner	.10	.10	.19	.19*
	(.09)	(.09)	(.12)	(.11)
	[.01]	[.01]	[.02]	[.02]
Father Visited in Hospital	.01	.01	.05	.05
	(.10)	(.11)	(.13)	(.13)
	[.00]	[.00]	[.00]	[.00]

***significant at 1% level; **significant at 5% level; *significant at 10% level

Note: All models include city indicators (estimates not shown). All covariates are measured at baseline except whether the father did not complete a 3 year interview and whether had a child with another partner. The latter was measured at the 1 year interview.

Table 4: Marginal Effects of Poor Infant Health on Subsequent Paternal Conviction and Incarceration, Selected Subgroups

	Conviction		Incarceration	
	Very Severe Infant Health Condition	Severe Infant Health Condition	Very Severe Infant Health Condition	Severe Infant Health Condition
Full Sample	.07** (N=2604)	.05** (N=2604)	.07* (N=2677)	.04** (N=2677)
High School Education or Less	.12** (N=1763)	.10*** (N=1763)	.12** (N=1806)	.09** (N=1806)
Poor Census Tract (30% or more of families below poverty)	.37** (N=419)	.18* (N=419)	.42* (N=374)	.23 (N=374)
Prior Conviction or Incarceration	.09 (N=510)	.14 (N=510)	.09 (N=501)	.18 (N=501)
Not Employed	.49*** (N=493)	.35*** (N=493)	.38* (N=512)	.24** (N=512)
Unmarried	.14** (N=1891)	.09*** (N=1891)	.14* (N=1943)	.09** (N=1943)
Cohabiting	.15*** (N=1095)	.07 (N=1095)	.12* (N=1093)	.11* (N=1093)
Neither Married nor Cohabiting	.16 (N=796)	.14** (N=796)	.15 (N=850)	.11** (N=850)

***significant at 1% level; **significant at 5% level; *significant at 10% level

All subgroups are defined by father baseline characteristics. Each model includes all relevant covariates from Table 3 except city indicators. Therefore, the full sample results, shown as comparisons, are slightly different from those in Tables 2.

Appendix: Coding of Measures of Poor Infant Health

The coding of abnormal conditions for this paper was designed to identify cases that were at least moderately severe, unlikely caused by prenatal behavior, had a poor long term prognosis, and were present at birth. A pediatric consultant was directed to glean information from the medical records (augmented with one-year maternal reports) and to assign all infant conditions a number between 1 and 16 according to the grid below. After giving the consultant the grid and clear instructions, the authors had no further input into how particular conditions were coded. If a child had multiple conditions, each condition was assigned a separate number.

Very Severe Infant Health Condition was coded as a one (yes) if the child had a health condition in cell #1. Examples of conditions in cell #1 are microcephalus, renal agenesis, total blindness, and Down Syndrome.

Severe Infant Health Condition was coded as a one (yes) if the child had a condition in cell #1 or the child was very low birthweight (less than 1500 grams).

Any Infant Health Condition was coded as a one (yes) if the child had a condition in either cell #1 or cell number #2. Examples of conditions in cell #2 are malformed genitalia, hydrocephalus, and cleft palate.

Appendix Table: Coding Grid for Infant Health Conditions

	Severity			
	High	Medium	Low	Unknown
Not Behavior Related	1	2	3	4
Possibly Behavior Related	5	6	7	8
Likely Behavior Related	9	10	11	12
Not Enough Information To Determine if Behavior Related	13	14	15	16