Understanding the Cycle:

Childhood Maltreatment and Future Crime

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Abstract

Child maltreatment is a major social problem. This paper focuses on measuring the relationship between child maltreatment and crime using data from the National Longitudinal Study of Adolescent Health (Add Health). We focus on crime because it is one of the most costly potential outcomes of maltreatment. Our work addresses two main limitations of the existing literature on child maltreatment. First, we use a large national sample, and investigate different types of maltreatment in a unified framework. Second, we pay careful attention to controlling for possible confounders using a variety of statistical methods that make differing assumptions. The results suggest that maltreatment greatly increases the probability of engaging in crime and that the probability increases with the experience of multiple forms of maltreatment.

I. Introduction

Child maltreatment, which includes both child abuse and child neglect, is a major social problem that has been neglected by economists. In the United States, mal-treatment is the leading cause of death from injuries in children older than a year. The death rate among children less than 15 is 2.4 per 100,000 and 1,500 children die every year (Institute of Medicine 1999). These deaths are only the tip of the iceberg. According to the U.S. Department of Health and Human Services (1996), more than a million children are victims of maltreatment annually. In two of the few economic studies to address the issue, Paxson and Waldfogel (1999, 2002) show that abuse and neglect are more common in families of lower socioeconomic status, so that maltreatment likely exacerbates differences in the life chances of rich and poor children.

Maltreatment may have many long-term consequences for survivors. This paper focuses on the effect of child maltreatment on crime using data from the National Longitudinal Study of Adolescent Health (Add Health). We focus on crime because it is one of the most socially costly potential outcomes of maltreatment and because the proposed mechanisms linking maltreatment and crime are relatively well elucidated in the literature. Yet there is still controversy about the extent to which a "cycle of violence" in which child maltreatment leads to future crime has been substantiated (compare with Widom 1989a). Economic models of crime typically focus on the adult criminal's human capital and cost/benefit calculations (Freeman 1999). In contrast, our research offers a glimpse at the reasons *why* criminal capital is accumulated and suggests that the process may begin in early childhood.

There have been several recent prospective longitudinal studies of child abuse, but these often rely on administrative data and have limited controls for other characteristics of families (see Ireland et al. 2002; Stouthamer-Loeber et al. 2001). Furthermore, administrative data on maltreatment and crime capture only a fraction of these behaviors because not all incidents are reported to or captured by government agencies. Finally, families for whom there are official records may be those that are more likely to come to the attention of official agencies, and thus may be an unrepresentative sample of families in which child maltreatment occurs (Smith and Thornberry 1995). Rebellon and Van Gundy (2005) note that little previous research has employed nationally representative samples. Other researchers (for example, Lansford et al. 2002, 2007) rely on maternal reports about whether the child has been subject to abuse. A difficulty with these studies is that the researcher is morally and legally obligated to intervene if current maltreatment is detected.

Our research contributes to the existing literature on the relationship between child maltreatment and crime in a number of ways. First, according to the National Research Council (NRC) (1993) most studies focus on one type of maltreatment (most often sexual abuse). Little is known about how the effects of different types of maltreatment compare (see Rebellon and Van Gundy 2005 for another critique). We examine the effects of different types of maltreatment in a unified framework. Second, most studies are based on clinical data and convenience samples that often include only maltreated children. In contrast, we use data from a national survey that includes a large "control" group of children who were neither maltreated nor committed crime. Third, one of the main limitations of the studies reviewed by the NRC panel is that most did not control adequately for potential confounders. In fact, the panel noted that "Distinguishing consequences that are associated directly with the experience of child maltreatment itself rather than other social disorders is a daunting task for the research investigator" (NRC 1993, p. 209). Households in which children are maltreated may have other characteristics that are associated with negative child outcomes and higher propensities to engage in crime. In our data, for example, children who were maltreated have mothers who are less educated and more likely to be on welfare. It is important to account for these differences appropriately.

We attack this problem using several different estimation methods, all of which rely on differing assumptions. These methods include: Ordinary Least Squares (OLS) with a rich set of controls as well as sibling and twin fixed effects. All of these methods have potential limitations, which we take pains to point out. However, the nature of child maltreatment makes it unthinkable to study it using an experimental design. We will show that the estimates we obtain are remarkably similar, regardless of estimation method. We believe that given the different assumptions implicit in the different estimation methods, this uniformity of results provides a strong, if not completely conclusive, argument that we are uncovering a causal effect.

II. Background

A. Why would Child Maltreatment lead to Crime?

Psychological explanations for the relationship between child maltreatment and crime are typically derived from three theoretical perspectives: Social Control Theory, Social Learning Theory, and Social-psychological Strain Theory. Social Control Theory assumes that individuals have a natural tendency towards crime and violence which is restrained by their social bonds (Hirschi 1969). By disrupting these bonds, maltreatment by caregivers makes individuals more likely to offend (see Zingraff, Leiter, Johnsen, and Myers 1994; Sampson and Laub 1993).

Social Learning Theory maintains that victims of maltreatment learn and adopt patterns of violent or delinquent behavior through processes of imitation and modeling. These behaviors are observed by children to result in positive outcomes (for example, control over others, or the acquisition of material or social benefits) (see Widom 1998; Garland and Dougher 1990; Walters and Grusec 1977).

Finally, Social-Psychological Strain Theory (SPST) focuses on maltreatment as a source of acute stress (Agnew 1985 1992). Many studies examine the relationships between maltreatment and outcomes such as behavior problems, developmental delays, and changes in brain functioning (for example, elevated cortisol levels) that may permanently alter the way that individuals respond to environmental stimuli (compare with Veltman and Browne 2001; Cicchetti and Rogosch 2001). These studies suggest that maltreatment could predispose a child to risky, self-destructive or aggressive behaviors. Claussen and Crittenden (1991) and Deblinger et al. (1989) document high rates of posttraumatic stress syndrome among children who have been abused, and Widom (1994) suggests that stress during critical periods may have an important impact on the development of aggressive behavior in adolescents.

These psychological theories have their analogues in economic thinking about crime. In the standard model (Freeman 1999) individuals assess the costs and benefits of committing crime. They refrain when the costs exceed the benefits. In turn, these costs and benefits depend on the options available to the individual; for example, the wages available to them in the noncriminal labor market, their skill at committing crime, and the social and economic gains that would be forfeited in the event of arrest or incarceration. Social Control Theory emphasizes one cost—broken social bonds—but ignores the others.

Social Learning Theory focuses on what an economist would think of as human capital development. When a child sees others committing crime, he builds up capital as a criminal, which may make him both a better criminal and a worse legitimate worker. The human capital perspective also offers insight into Social-Psychological Strain Theory. Economists have begun to explore the effects of events in early childhood on the development of both cognitive and noncognitive skills (Cunha and Heckman 2008; Cunha, Heckman and Schennach 2010). There is increasing evidence that events early in life have far reaching consequences for the skills of adults (Currie 2009; Almond and Currie 2011). SPST emphasizes one way in which maltreatment impairs the development of critical noncognitive skills in the developing child.

B. Prior Evidence on the Effects of Maltreatment on Crime and Delinquency

Several recent studies have examined the long-term consequences of child maltreatment using designs that are more sophisticated than those critiqued by the NRC panel. The first group establishes a cross-sectional relationship between past experiences of maltreatment and other past adverse events, and current risky behaviors/ outcomes. For example, Felitti (1998) and Dube et al. (2003a) show that adverse childhood experiences (ACEs) are correlated with future risk for depressed affect, suicide attempts, multiple sexual partners, sexually transmitted diseases, smoking, and alcoholism. Dube et al. (2003b) provides further evidence about the relationship between ACEs and future use of illicit drugs, while Hillis et al. (2004) report on the relationship between ACEs and teen pregnancy.

While provocative, these relationships do not necessarily imply that ACEs *cause* risky behaviors. If, for example, poverty is associated with ACEs then the fact that people with ACEs have higher rates of criminal activity could actually reflect a causal relationship between poverty and involvement in crime. This would indicate that the effect of ACEs on risky behaviors is estimated with bias. Moreover, most ACE studies aggregate maltreatment

with other forms of household dysfunction rather than trying to separately identify the effect of maltreatment.

A second group of studies is more closely related to the current study in that they control for family background factors such as poverty by using samples of twins in which one twin was maltreated and the other was not. Nelson et al. (2002), Kendler et al. (2000) and Dinwiddie et al. (2000) use this design to examine the effects of child sexual abuse on future psychiatric problems. The first two studies conclude that maltreated twins are more likely than their nonmaltreated twins to suffer negative outcomes. However, Dinwiddie finds no differences between maltreated and nonmaltreated twins.

The twin-comparison design, which is also one of the methods used in this study, offers a compelling way to control for unobserved family-level characteristics, which are likely to be correlated with both maltreatment and crime. However, it does raise the issue of why one twin is treated differently than the other. The design may also exacerbate the effects of random measurement error (which would result in fixed effects estimates that were smaller than those obtained by OLS). The design might also underestimate effects of maltreatment if both children were traumatized by the experience of one of the twins having been abused. We will address these issues further below.

One of the best known studies of the long-term effects of maltreatment is by Widom (1989b) who matched a sample of 908 children with substantiated cases of maltreatment to controls who were selected to be similar in terms of age, sex, race, and socioeconomic status. This study is unusual in that it distinguished between physical abuse, neglect, and sexual abuse, and also involved long-term followup of the subjects. She finds substantial effects of both abuse and neglect on arrest both as a juvenile and as an adult: Being abused or neglected as a child increases an individual's risk for an arrest as a juvenile by 53 percent, increases the probability of arrest as an adult by 38 percent, and increases the probability of an arrest for a violent crime by 38 percent.

However, matching on a small number of observable traits provides no guarantee that the controls are really similar to the "experimental" group in terms of unmeasured as well as measured characteristics. Widom also points out the limitations of relying on administrative data from an era in which mandatory reporting of child maltreatment did not exist. We believe that it is useful to try to replicate Widom's results using nationally representative data (hers were from a Midwestern town), a more recent cohort, and alternative statistical methods. Another strength of our study is that, like Widom, we examine the effects of physical abuse, neglect, and sexual abuse in a unified framework.

III. Data

Our data are drawn from the National Longitudinal Study of Adolescent Health (Add Health). Add Health was specifically designed to investigate adolescents' health and risk behaviors. It is considered the largest and most comprehensive survey of adolescents ever undertaken. A stratified sample of 80 high schools was selected to be representative of the U.S. school system with respect to region of country, urbanicity, school size, school type, and ethnicity. For each of these 80 schools, another school, called a feeder school, was selected on the basis of its students' contribution to the high school. Therefore, the school-based sample is based on 80 pairs of schools.[1] An in-school questionnaire was administered to more than 90,000 students (virtually all students) in these sampled schools between

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[1]Participating high schools were asked to identify junior high or middle schools that were expected to provide at least five students to the entering class of the high school. Some schools were their own feeder schools. Therefore, the total number of schools in Add Health is actually 132.

September 1994 and April 1995. A random sample of some 200 students was selected from each of these schools for more detailed in-home interviews, conducted between April and December 1995. A total of 20,745 adolescents were interviewed for Wave I. Interviews were also conducted with parents during Wave I. The adolescents are inter-viewed for the second time in 1996 for Wave II, and for the third time between August 2001 and April 2002 for Wave III. The number of individuals interviewed in Wave III is 15,197. Excluding people with missing data on at least one maltreatment measure results in a sample of 13,509 individuals, which we use in our OLS analyses. There are 3,428 siblings in the data, but eliminating those with missing data (or whose sibling was missing data) yields a sibling sample of 2,216 children.

The Add Health sampled twins with certainty, and there are a total of 695 pairs of twins and two triplets in the Wave I Add Health sample. However, our empirical analysis of twins is based on 464 twins, either because at least one of the twins does not appear in Wave III or because of missing data on key variables. Further information about sample selection is in the Data Appendix.

A. Measures of Maltreatment

In Wave III, respondents answered questions about the way they were treated by their parents or other adults who took care of them before they were in the sixth grade. Specifically, they were asked whether and how often:

1. Parents (or other adult caregivers) had not taken care of their basic needs, such as keeping them clean or providing food or clothing.

2. Parents (or other adult caregivers) slapped, hit, or kicked them.

3. Parents (or other adult caregivers) had touched them in a sexual way, forced them to touch him or her in a sexual way, or forced them to have sexual relations.

4. Parents (or other adult caregivers) left them home alone when an adult should have been with them.

Previous studies of child maltreatment have noted the difficulty of finding a definition of the concept that is clear, unambiguous, and acceptable to all (Doueck et al. 1987; Vissing et al. 1991). However, we believe that the wording of the questions in Add Health reflects an emerging consensus about definitions of maltreatment as reflected, for example, in government sources like the Administration for Children (ACF) and Families of the Department of Health and Human Services.[2] It is important to note that a third of the child fatalities attributed to maltreatment involve neglect rather than physical or sexual abuse, while 40 percent involve multiple maltreatment types, most often both abuse and neglect (U.S. DHHS 2010). Hence, we feel that it is important to investigate neglect rather than focusing only on physical and sexual abuse. A limitation of our data set is that while we know how many times children were slapped, hit, or kicked, we cannot identify severe physical abuse. It seems likely that the effects of such severe abuse are greater than those we report below.

Another limitation of the data on maltreatment is that they are based on self-reports. Several researchers have studied the validity of self-reported data on child maltreatment and have concluded that, if collected properly, these data are valid (Allen, Leadbeater, and Aber 1994; Dembo et al. 1991). In our data, the respondents listened to prerecorded questions on sensitive topics through earphones and entered their answers directly on laptops in order to

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[2]For example, the definitions given by Child Welfare Information Gateway of the ACF are consistent with those of Add Health (see: http://www.childwelfare.gov/systemwide/laws_policies/statutes/define.cfm/).

maintain confidentiality and to minimize the potential for interviewer or other third-party influence. In order to obtain accurate responses about the timing of events, subjects were prompted with a calendar that gave the dates of many important events. Mocan and Tekin (2005, 2006) and Tekin and Markowitz (2008) provide evidence that rates of many of the risky behaviors reported in the Add Health are consistent with other sources.

Like many other studies, ours is based on retrospective reports of maltreatment. It is possible that people tend to forget past maltreatment as they grow older. We have investigated "forgetting" directly by examining whether the older people in the sample were less likely to report childhood maltreatment than those who were age 18. We find no evidence that this is the case.

Another potential problem is that people with negative outcomes may be more likely to report childhood maltreatment. For example, they may blame past maltreatment for their current problems. In this case, Ordinary Least Squares (OLS) estimates will tend to find "effects" of maltreatment that are too large. Measurement error of this type could also bias sibling or twin fixed effects models. Suppose that one twin is more likely to report bad things in general. Then this twin will be more likely to report both maltreatment and crime leading to spurious results.

We investigated this problem in the case of twins by examining responses to a series of questions that should have been answered in the same way by both twins. These questions included whether or not the father was in jail at Wave I; how far the two twins lived away from each other; how often the twins saw each other; and how often the twins fought with each other. As shown in Appendix Table A1, we found few statistically significant correlations between differences in the twins' reports about maltreatment and differences in reports about these other variables. These findings increase our confidence about the reliability of the twin reports and provide some evidence against the hypothesis that one twin is just "more negative" than the other.[3]

Table 1 shows the fraction of respondents reporting various forms of maltreatment. Roughly eleven percent of the sample report that their parents ever failed to meet their basic needs. Only 4.8 percent of the sample report any form of sexual abuse, while roughly a third of the respondents report that their parents ever left them alone when they "should have been supervised" or that their parents hit them. While these later figures seem especially high, they are broadly consistent with other studies. For example, Scher et al. (2004) use a sample of 967 adults from a community survey in Memphis Tennessee to determine the prevalence of retrospectively reported child maltreatment and find that 30 percent of women and 40 percent of men reported some form of maltreatment while 19 percent reported physical abuse, 18 percent reported neglect, and 5 percent reported sexual abuse.

Defined this way, more than half of the children report some form of "maltreatment." However, we examined the distribution of reports and found that only 8.2 percent report that they were left alone when they should have been supervised more than 10 times, while 6.3

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[3]To further examine whether people who tend to blame others are more likely to use past maltreatment as an excuse for their criminal behavior in our sample, we examined the responses to a question asking people who had been convicted of a crime whether they were actually guilty of that crime. We argue that if people who report that they were not guilty of the crimes that they were convicted of are more likely to blame others for their problems, then one might also expect these individuals to report more abuse than those who report that they were actually guilty of their crimes. There are 815 individuals in Add Health who reported being convicted of a crime at least once. Among these individuals, 170 (21 percent) reported that they had not committed the crime in at least one of these convictions. A test comparing the means of our abuse variables between these 170 individuals and the rest (645 individuals who responded that they were guilty in all cases) failed to reject the null that the two means were the same. As an alternative, we also repeated this test looking at the most recent convictions. Again, we failed to reject the equality of the means of our abuse variables between the two groups for all of our measures.

percent indicate that they were hit, kicked, or slapped by their parents or other adult care givers more than 10 times. If we use these higher thresholds for neglect and physical abuse then we find that 23.1 percent of respondents report that they were maltreated in any way. In what follows we will report results using all of these different potential measures of maltreatment.

Column 2 shows that the fraction of twins who report maltreatment is similar to that reported in the full sample. Column 3 shows the fraction of twins who have different reports of maltreatment. This column shows that discrepant reports are quite common, which is necessary if we are to identify effects of maltreatment in twin models. Columns 4 and 5 report the fraction of the sibling sample who report various types of maltreatment and the fraction of sibling pairs with discrepant reports. Again, the fractions are quite similar to those for the full sample.

B. Measures of Crime

The Add Health asks many questions related to delinquent and criminal activity. The crime questions in Add Health are similar to those found in other surveys and to official definitions of "crime" found in government sources such as the Bureau of Justice Statistics. We focus on six questions that emphasize serious and/or common crimes committed in the 12 months prior to the survey. The crimes we examine include property damage, assault, armed robbery, burglary, theft, and any hard-drug use in the past 12 months. We also look at a summary measure of whether any nondrug crime was committed in the past 12 months, and whether the respondent was ever convicted. Finally, we look at whether the respondent was himself/herself a victim of a crime in the past 12 months. Our measure of victimization is a composite obtained by combining answers to seven questions about whether the respondent had a gun/knife pulled on him/her, was shot or stabbed, was beaten up without anything being stolen/with something stolen, or was otherwise injured by someone at least once in the past 12 months. The definitions and means of outcomes and other variables used in the analyses are presented in Table 2.

Our rationale for examining victimization is that while many innocent people are the victims of crime, people who are themselves engaged in crime (for example, drug dealers), or those with criminals in their peer groups, are likely to be at higher risk. In fact, our data suggest that victimization is much more likely among those who report committing crime. For example, more than 38 percent of individuals who have committed any nondrug crime in the past 12 months also report having been victimized during the same period. On the other hand, only 5.2 percent of those who have not committed any of these offenses reported victimization. Similarly, the percentage of hard-drug drugs users is 20 percent among victimized individuals, but only 10 percent among those who report no victimization.

The first panel of Table 2 shows means of these outcomes by whether or not respondents suffered various types of maltreatment. The table indicates that across almost every domain, children who suffered maltreatment are at least twice as likely to have engaged in crime as those who did not. They are also more likely to have been convicted, and to have been victimized themselves. Table 2 also offers some support for the idea that those who suffer the worst maltreatment have the worst outcomes. For example, those who were left alone or physically abused more than ten times have worse outcomes than those who report less frequent abuse or neglect.

C. Explanatory variables

Of course there may be many other factors that differ between children who were maltreated and those who were not. Failing to control for these factors would cause bias in the

estimated effect of maltreatment on crime. One advantage of the Add Health is that it allows us to control for a rich set of individual and family background characteristics that may be correlated with both maltreatment and criminal behavior. The second panel of Table 2 shows some of the explanatory variables used in the analyses (for a full list, see Appendix Table A2). We see, for example, that consistent with Paxson and Waldfogel (1999, 2002) children who were maltreated are more likely to have a mother with less than a high school education, more likely to have had a father in jail at Wave I, more likely to have been on welfare at Wave I, and more likely to have a mother who was a teenager at the time of her child's birth. Overall, children whose families were poor at Wave I are much more likely to report maltreatment in childhood. It is clearly important to control for differences between families.

The last panel of Table 2 focuses on characteristics of maltreated children that might differ within families. Panel 3 shows that maltreated children were somewhat more likely to have been reported by their parents to be "bad tempered" at Wave I. Similarly, maltreated children were also more likely to have had symptoms of ADHD between ages 5 and 12. Males are more likely to report every type of maltreatment except sexual abuse. However, there is little systematic relationship between maltreatment and whether the parent reported a learning problem and between maltreatment and birth weight except that those who were of low birth weight are more likely to report that they were victims of sexual abuse. We will show below that while some of these individual characteristics are important predictors of maltreatment, controlling for them has virtually no impact on the estimated effect of maltreatment.

IV. Empirical Methods

In order to identify the effect of child maltreatment on future criminal activity, we will attempt to compensate statistically for potential confounders. We will begin with OLS models of the effects of different maltreatment measures on the criminal activity and victimization outcomes. These models will be of the form:

$$Outcome = \beta + \beta_1 * Maltreatment + \beta_2 * X + \beta_3 * State + \varepsilon, \quad (1)$$

where *Outcome* is one of the binary crime measures, *Maltreatment* is one of the measures of maltreatment, *State* is a vector of state-specific fixed effects that control for differences in state institutions and persistent differences in state income, *X* is a vector of individual and family control variables, and   is the error term.

We estimate Equation 1 using linear probability models and two different versions of *X*.[4] The first is a "short list" of controls which includes dummies for each year of child age at the time of the survey; child gender, child race, whether the child is Hispanic, and whether the child is U.S.-born. The second version of *X* is a much fuller list of controls which also includes: the child's birth weight (< 1,500; 1,500–2,500; > 2,500 grams, missing); whether the child is the first born, first born missing; whether the parent reports that the child has learning problems at Wave I; whether the child is reported to be "bad tempered" at Wave I; whether the child had ADHD symptoms between ages five and 12; mother's education (less than high school, high school, more than high school, missing); mother's age at birth (19, 20–30, 31–40, 41 +, missing); parents' religion (Catholic, Baptist, Other Protestant, Other, None, Missing); number of siblings (none, one, two, three, four or more, missing); father present (biological, step, or missing); father ever jailed (or ever jailed missing); family on

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[4]OLS estimates of coefficients in linear probability models are consistent estimates of average probability derivatives, but the standard error estimates are biased by heteroskedasticity; therefore, we report standard errors corrected for heteroskedasticity.

AFDC in Wave I (or missing); poverty status   0.5*poverty, (0.51–1)*poverty, (1.01–2)*poverty, > 2*poverty, missing. By comparing OLS estimates using the short list of controls with those estimated using the full list of controls we can gain insight into how sensitive the estimates are to adding controls.[5]

We next turn to models estimated using siblings and twins. In order to implement this design, we restrict our sample to sibling or twin pairs, and estimate models of the form:

$$Outcome = \beta + \beta_1 * Maltreatment + \beta_2 * X^{'} + \beta_3 * PairID + \varepsilon^{'}, \quad (2)$$

where now X is a much smaller vector of control variables that vary within sibling or twin pairs (gender and birth weight) and *PairID* is a vector of unique binary identifiers (or fixed effects) for each pair. By including sibling or twin fixed effects in Equation 2, we control for all of the common elements of family background that are shared by the siblings or twins, such as poverty.

In cases of child maltreatment, it is not uncommon for one child to be abused while the other children in the family are unharmed (see, for example, *New York Times* 2006). There has been some previous research into the reasons for disparate treatment of twins, in particular. For example, Jaffee et al. (2004) examine cases of abuse in pairs of identical twins and report four reasons why one twin was treated differently than the other: One twin had been ill; the mother had a folk belief that children had to have opposite personalities, or that one had to be dominant; the mother identified one of the twins with herself; or the mother identified one of the twins with a partner or ex-partner. Surprisingly, there was no consistent pattern in terms of which twin was treated worse. For example, some mothers reinforced health differences while others appeared to compensate for them. Our approach to this problem is to control for differences in important child-level measures of temperament, learning ability, and health.

V. Results

Table 3 shows OLS estimates for the full sample with varying lists of controls. The maltreatment variable is "any maltreatment" defined using the "greater than 10 times" cutoffs for being left alone and for physical abuse. The first column shows an OLS model with a limited set of controls, the second column shows models with parental reports of the respondent's behavioral problems during childhood including bad temperament, learning problems, and ADHD, the third column presents models estimated with a full list of child and family characteristics, and the fourth column shows models that include school fixed effects. It is remarkable that the inclusion of additional controls has very little effect on the estimated "maltreatment" coefficients in the OLS models. Relative to the Table 2 means, these estimates suggest that maltreatment roughly doubles the probability of being involved in any nondrug related crime.

The fifth and sixth columns of Table 3 show separate estimates for males and females. OLS estimates indicate that maltreatment is associated with increased criminality for both males and females, but the estimates also suggest that maltreatment has much larger effects on males than on females.

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[5]In a previous version of this paper, we also used the observable data to estimate models using propensity matching methods (compare with Rosenbaum and Rubin 1983). Unlike regression techniques, these estimators did not impose any functional form restrictions or impose homogeneous treatment effects across the population. The results were much the same as those reported below and are available from the authors upon request.

One might argue that maltreatment is the result of the respondent's behavior as a child, for example, abusive parenting may have begun in response to the behavior of a temperamentally difficult child (Lykken 1995). In this case, the estimated effect of maltreatment from Column 1 would include both the actual effect of maltreatment and the effect of the child's temperament. However, a comparison of the estimates in Columns 1, 2, and 3 suggest that controlling for temperament, learning disabilities, ADHD, and low birth weight (in addition to many observable family background characteristics) has little impact on the estimated effect of maltreatment.

The coefficients on the other control variables in the OLS models are generally consistent with those described in the literature. To economize on space, we present the full set of coefficients for "Any maltreatment" models similar to Column 3 of Table 3 in Appendix Table A3. This table shows, for example that having a father in jail at Wave I is strongly predictive of child criminal behavior, and doubles the probability of engaging in some crimes. Similarly, being male is associated with large increases in all types of criminal behavior, often doubling or tripling the probability that someone engages in crime. Age is negatively associated with criminal activity. For example, the propensity to commit any nondrug crime falls by about seven percentage points between age 25 and age 18. Being white is associated with lower probabilities of committing nondrug type of crimes but with higher probabilities of using hard drugs. This pattern is reversed for blacks. Having been born outside the United States is associated with lower propensities of committing crime. Consistent with Currie and Stabile (2006, 2009) ADHD symptoms are strongly related to future crime. But as discussed above, controlling for ADHD has little impact on the estimated effect of maltreatment.

Table 4 shows OLS models for the twin and sibling subsamples. It is useful to compare these estimates to those of Table 3 in order to get a sense of how changing samples affects the estimates. Column 1 of Table 4 indicates that OLS estimates are uniformly larger in the twins subsample than in the full sample, though in most cases we cannot reject that the coefficients are the same given the larger standard errors in the twins sample. However, Column 2 indicates that estimates in the sibling subsample are very similar to those in the full sample.

This comparison suggests that the effects of abuse may be larger in the twin subsample. One possible explanation for this pattern is a nonlinear effect of maltreatment on crime. If twins are more vulnerable to the effects of maltreatment, then maltreatment could have a larger effect. Reasons that twins might be more vulnerable include a higher incidence of premature birth, neonatal complications, isolation, financial pressures, increased levels of parental stress and exhaustion, and increased family size (Nelson and Martin 1985). Moreover, conditional on reported abuse, we found that twins were more likely to report that social services investigated how the child was taken care of or tried to take the child out of his/her living situation. This difference may indicate that twins were indeed more severely abused than nontwins.

Nevertheless, even the smaller sibling estimates suggest large and statistically significant effects of maltreatment on most indicators of criminal activity. For example, individuals who were subject to any type of maltreatment are 11.1 percentage points more likely to commit some type of nondrug offense in the sibling sample. Estimates from the sibling sample suggest that maltreated children are significantly more likely to commit burglary (by 2.8 percentage points), assault (by 5.2 percentage points), theft (by 2.7 percentage points), as well as to damage property (by seven percentage points). The estimates suggest that maltreatment not only increases the probability that an individual will engage in crime but

also increases the probability that he or she will be a crime victim (by 6.6 percentage points) as well.

The next two columns present estimates by gender using the sample of siblings. These estimates are based on samples with at least two boys or at least two girls. That is, sibling pairs with a boy and a girl are excluded. The literature on the link between abuse and crime suggests that there may be gender differences in the propensities of males and females to engage in serious, persistent, and violent crime (Lanctot and LeBlanc 2002). However, studies examining these gender differences have produced mixed results. For example, Rivera and Widom (1990) found that maltreated males were at greater risk of committing a violent offense than a matched control group while this was not true among females. However, Maxfield and Widom (1996) found that abused females were at a greater risk of arrest for violence than control females whereas the relationship was barely significant for abused males.

Within these same-gender subsamples of siblings, the estimated effects of crime on boys and girls are quite similar overall, though consistent with Lanctot and LeBlanc (2002), there are some gender differences in the types of crime. Maltreated boys appear to be more likely to engage in armed robbery or assault, while mistreated girls are more likely to engage in burglary or theft. Both maltreated boys and girls are more likely to have damaged property and to have been victims of crime (though the later effect is larger for boys than girls).

Estimates from twin and sibling fixed effects models are shown in Table 5. While standard errors generally increase in these specifications relative to OLS, the estimated effects are remarkably similar to those reported in Table 4. For example, in the sibling fixed effects models, maltreated children are estimated to be 8.6 percentage points more likely to engage in any nondrug crime compared to the 11.1 percentage points estimated in the OLS models. The last two columns in Table 5 present gender-specific estimates from the sibling fixed effects models. The gender-specific estimates suggest that both maltreated boys and maltreated girls are more likely to commit crime although the estimates are much less precisely estimated.

Table 6 explores the effect of different types of maltreatment on crime, using the sibling fixed effects models. We focus on sibling fixed effects because the OLS estimates from the sibling sample are quite similar to those from the full sample, suggesting that the sibling fixed effects estimates may be more representative of the typical child than the twin fixed effects estimates.

This table shows quite different effects of different forms of maltreatment. Leaving children alone when they should have been supervised appears to be relatively benign. But having parents who ever failed to meet one's basic needs greatly increases the probability of assault, damaging property, and being a victim. Similarly, having a parent who ever struck, hit, or kicked them increases the probability of criminal activity, and the effect tends to be greater if the parent struck them frequently. Sexual maltreatment has the largest negative effects: For example, respondents who report that they were sexually abused are 24.5 percentage points more likely to have committed any nondrug offense. A comparison of the first two lines of Table 6 offers some support for our emphasis on a measure of "any maltreatment" that uses the "greater than 10 times" cutoffs for frequent physical maltreatment and being left alone: This measure is more often statistically significant and tends to have larger effects than a measure of whether there was ever any maltreatment.

One index of the severity of maltreatment is whether more than one type of maltreatment took place. For example, if sexual abuse and neglect cause crime separately, one might expect that a person who experienced both sexual abuse and neglect would be at a higher

risk of committing crime than a person who had only one of these experiences. Our data show that joint experiences of maltreatment are common. For example, sexual abuse is three times (two times) higher among those who also experienced physical abuse (neglect) than those who did not experience physical abuse (neglect). Similarly, physical abuse is twice as common among those who were neglected as among those who were not neglected. The distribution of joint experiences of maltreatment is as follows: 76.9 percent of our sample report no maltreatment (using > 10 times cutoffs for physical abuse and neglect); 16.1 percent report only one type of maltreatment; 5.4 percent report two types of maltreatment; 1 percent report three types of maltreatment; and 0.18 percent report all four types of maltreatment.

In order to examine the hypothesis that the probability of engaging in crime increases with the joint experiences of maltreatment, we created binary indicators for experiencing multiple types of maltreatment and estimated models with sibling fixed effects. Since there are few people reporting more than two types of maltreatment, we create two dummy variables representing "only one type of maltreatment" and "two or more types of maltreatment." The omitted category is "no maltreatment." The results presented in Table 7 suggest that the probability of crime increases with multiple forms of maltreatment. For every type of crime, the estimated effect is larger if the person suffered two or more types of maltreatment. And although relatively few children report three or more types of maltreatment so that we must exercise caution in interpreting these estimates, such treatment is estimated to increase the probability of engaging in any nondrug crime by 40.3 percentage points.

VI. Discussion and Conclusions

In order to determine the social cost of child maltreatment, we need to quantify its effects on important outcomes. This paper focuses on the effects on crime. We find that child maltreatment roughly doubles the probability that an individual engages in many types of crime. The large size of these effects suggests that maltreatment may generate large externalities in terms of the costs of crime. It is important to note that our estimates represent an "overall" effect of maltreatment on crime in that we do not control for potential mediators such as educational attainment.

One potential explanation for the large effects is that children who experience maltreatment start engaging in crime earlier. Widom (1989b) shows that abused or neglected children are more likely to be arrested both as juveniles and as adults. Starting to engage in criminal behavior early may develop a child's expertise in crime at the expense of legitimate activities such as work or schooling, which would increase the returns to crime relative to other activities. We looked at this timing issue by estimating models of the effects of maltreatment on the likelihood of having been convicted in a juvenile court. The OLS estimates were positive, large, and statistically significant. In particular, we found that being a victim of maltreatment increased the probability of being convicted as a juvenile by about two percentage points. The mean value for juvenile conviction among those who were not maltreated is about 1.4 percent, so an effect of this size suggests that maltreatment approximately doubles the probability of juvenile conviction. Sibling and twin fixed effects models yield similar point estimates, although the estimates are less precisely estimated due to the smaller sample size.

Our results suggest that while not everyone who is abused becomes a criminal, maltreatment is a major determinant of future criminal behavior. The estimates indicate that the effects of maltreatment are large relative to other factors that have been studied in the Economics literature such as unemployment (Corman and Mocan 2005), education (Jacob and Lefgren 2003), gun ownership (Mocan and Tekin 2006; Duggan 2001), the introduction of crack

cocaine (Grogger and Willis 2000), the legalization of abortion (Donahue and Levitt 2001), and exposure to lead through paint or gasoline (Reyes 2007; Nevin 2007).

Table 8 considers a crude translation of our estimates into dollar terms, using estimates of the costs of crime taken from the literature. The results of this exercise are sensitive to the estimated cost per crime, which varies widely between papers. Lochner and Moretti (2004) use estimates of the cost of crime that take account of the impact on victims, as well as the costs of incarceration. Their estimates do not take account of other costs, such as the costs of avoiding crime, and thus should probably be regarded as lower bounds. Cohen (2004) derives estimates based on "willingness to pay" for crime reduction. These estimates may well be upper bounds given that people are not required to pay anything to fill in willingness to pay surveys. The available estimates cover only some of the crimes that we examine in our data and some types of crime for which estimates exist are not represented in our data. For example, the largest estimated costs of crime are for murder, which is such a rare outcome that we cannot look at changes in its incidence in our data.

The Lochner and Moretti estimates suggest that the crime induced by maltreatment costs society at least $6.4 billion ($2,006) per year. The Cohen estimates suggest a much larger figure of $55 billion. It would be interesting to compare these figures to the cost of preventing maltreatment. Unfortunately, few intervention programs have been proven to be effective in rigorous studies. Olds et al. report that randomized trials of nurse home visiting programs that start before birth show that these programs can reduce the incidence of substantiated cases of maltreatment by 50 percent (Olds et al. 1999), and that such programs have also had an impact on crime (Olds et al. 1998)[6]. This research has attracted attention at the highest levels, and President Obama's 2010 budget blueprint contained funding for such programs. At a cost of about $4,000 per child in total, the steady-state cost of providing this service to all children would be about $14 billion per year (assuming that there are roughly 3.5 million children born each year). Given that the crime induced by maltreatment is only one of the social costs of maltreatment, these estimates suggest that a home visiting program like Olds' might well pay for itself, even using conservative estimates of the costs of crime. If we attach some benefit to improving the lives of poor children (beyond the value we attach to saving taxpayers money) then the cost-benefit analysis begins to look even more favorable.

In summary, our study provides new evidence that the apparent negative effects of maltreatment on children's propensity to engage in crime are likely to be real and not simply artifacts of other features of dysfunctional families, or even of dysfunctional children. Our estimates imply that being maltreated approximately doubles the probability of engaging in many types of crime. Sexual abuse appears to have the largest effects on crime, perhaps justifying the emphasis on this type of abuse in the literature and in the media. Moreover, because sexual abuse can never be justified or excused by a young child's personality or behavior, our finding of large effects for sexual abuse supports a causal interpretation of our findings. That is, we think it unlikely that sexual abuse of a child is caused by that child's personality or behavior, so that the estimated effects of this type of abuse are unlikely to be confounded by omitted characteristics of the child. Finally, the probability of engaging in crime increases with the experience of multiple forms of maltreatment. This finding suggests that criminal behavior increases not only with the incidence of maltreatment but also with the severity of maltreatment.

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[6]It is important to be clear that not all home visiting programs have these effects. The Olds et al. stresses a focus on at risk mothers, and the use of professional nurse visitors.

Acknowledgments

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Data Appendix

Sample Selection and Attrition

The number of individuals interviewed in Wave III of Add Health is 15,197. Eliminating observations with at least one of the maltreatment missing results in 13,509 observations. Our OLS analysis is based on these 13,509 observations. Comparing the crime outcomes of the 1,688 respondents who are dropped with those of the analysis sample (13,509 observations) indicates that those who are dropped have somewhat higher rates of criminal behavior, but the differences in means are significant only for "any crime," "assault," and "victim." If those with missing maltreatment data were actually more likely to be abused, then our estimates understate the effects of abuse on crime.

Note that in some of the models, we control for school fixed effects. School identifiers are missing for some individuals. Therefore, the school fixed effects models contain 13,252 observations.

There are 3,428 siblings in the data, which includes 1,575 families with two siblings, 90 families with three siblings, and 2 families with four siblings. Merging the sibling sample with Wave III of Add Health and eliminating observations with missing maltreatment results in a sample of 2,750 individuals, but a further 534 now have no sibling in the data, so are dropped from the sibling sample as well. Thus, the analysis of siblings is based on 2,216 individuals, which includes 2,064 individuals from families with two siblings, 144 individuals from families with three siblings, and eight individuals from families with four siblings.

There are 1,396 twins in the data. This includes 695 pairs of twins and two pairs of triples. Merging the twin sample with the Wave III of Add Health and eliminating observations with missing maltreatment results in a sample of 1,136 individual twins. Another 208

observations are lost because only one twin is left in the data. Thus, the twin analysis is based on 928 twins and no triplets.

Table 1

Fraction of Add Health Sample Reporting Maltreatment

Type of Maltreatment	(1) All	(2) Twin Sample	(3) Fraction of Twin Families with Different Reports	(4) Sibling Sample	(5) Fraction of Sibling Families with Different Reports
Ever left alone	0.397	0.405	0.409	0.394	0.419
Left alone > 10 times	0.082	0.082	0.129	0.071	0.118
Ever basic needs unsatisfied	0.113	0.126	0.161	0.123	0.191
Ever hit, spanked, kicked, etc.	0.292	0.279	0.330	0.292	0.387
Hit, etc. > 10 times	0.063	0.050	0.078	0.056	0.089
Ever sexual abuse	0.048	0.057	0.101	0.051	0.093
Ever any abuse	0.526	0.518	0.412	0.529	0.438
Any abuse using > 10 times cutoffs for physical abuse and being left alone	0.231	0.241	0.272	0.231	0.297
Number of observations	13,509	928		2,216	

Table 2

Definitions and Means of Outcomes and Explanatory Variables by Any Maltreatment and Type of Maltreatment

Variable Name	Definition	Full Sample	Never Any Maltreatment	Ever Left Alone	Left Alone > 10×	Ever Fail to Meet Needs	Ever Physical Abuse	Physical Abuse > 10×	Ever Sexual Abuse
1. Outcomes									
Any nondrug (N = 13,452)	= 1 if committed any of the nondrug crimes in the past 12 months, else = 0	0.164	0.109	0.226	0.241	0.295	0.244	0.261	0.324
Armed robbery (N = 13,482)	= 1 if used or threatened to use a weapon to get something from someone else in the past 12 months, else = 0	0.020	0.011	0.031	0.028	0.058	0.038	0.034	0.074
Burglary (N = 13,482)	= 1 if went into a house or building to steal something in the past 12 months, else = 0	0.019	0.009	0.030	0.040	0.050	0.035	0.031	0.068
Assault (N = 13,489)	= 1 if pulled a knife on someone, shot someone, or badly hurt someone in the past 12 months, else = 0	0.071	0.049	0.100	0.094	0.155	0.105	0.108	0.193
Damaged property (N = 13,453)	= 1 if deliberately damaged property that belonged to someone else in the past 12 months, = 0 otherwise	0.086	0.052	0.122	0.132	0.141	0.135	0.156	0.159
Theft > $50 (N = 13,478)	= 1 if stole something worth more than 50 dollars in the past 12 months, else = 0	0.033	0.018	0.050	0.053	0.075	0.056	0.049	0.099
Any hard drugs (N = 13,502)	= 1 if used any hard drugs (heroin, crystal meth, cocaine, LSD, ecstasy, inhalants, PCP, mushrooms, etc.) in the past 12 months, else = 0	0.120	0.085	0.151	0.208	0.149	0.170	0.185	0.183
Victim (N = 13,486)	= 1 if the respondent had a gun/knife pulled	0.106	0.077	0.144	0.139	0.227	0.152	0.149	0.263

Variable Name	Definition	Full Sample	Never Any Maltreatment	Ever Left Alone	Left Alone > 10×	Ever Fail to Meet Needs	Ever Physical Abuse	Physical Abuse > 10×	Ever Sexual Abuse
Ever convicted (N = 13,493)	on them, was shot or stabbed, was beaten up without anything being stolen/ with something stolen, or was otherwise injured by someone at least once in the past 12 months, else = 0 = 1 if ever convicted in an adult or a juvenile court, else = 0	0.060	0.040	0.085	0.110	0.117	0.093	0.126	0.099
2. Selected Explanatory Variables									
Mother Ed < HS[a]	= 1 if the mother has less than high school degree, = 0 otherwise	0.157	0.151	0.163	0.165	0.223	0.174	0.183	0.223
Jailed father	= 1 if the biological father was ever jailed, = 0 otherwise	0.144	0.103	0.189	0.241	0.222	0.205	0.245	0.246
Welfare	= 1 if parents were on welfare during Wave I, = 0 otherwise	0.085	0.077	0.090	0.089	0.161	0.098	0.100	0.160
Sibling4 +	= 1 if four or more siblings, = 0 otherwise	0.081	0.085	0.073	0.053	0.098	0.082	0.083	0.097
Income < 50 percent of poverty	= 1 if parental income was less 50 percent of poverty line at Wave I, = 0 otherwise	0.055	0.052	0.057	0.063	0.097	0.063	0.068	0.085
Mother age at birth 19[a]	Mother's age at respondent's birth was 19 or less, = 0 otherwise	0.101	0.092	0.115	0.134	0.144	0.119	0.118	0.156
3. Means of child characteristics that may differ within families									
Male	= 1 if male, 0 = otherwise	0.459	0.436	0.491	0.495	0.567	0.489	0.482	0.432
ADHD	= 1 if exhibited symptoms of ADHD from 5–12, = 0 otherwise	0.076	0.057	0.095	0.146	0.128	0.099	0.131	0.129

Variable Name	Definition	Full Sample	Never Any Maltreatment	Ever Left Alone	Left Alone > 10×	Ever Fail to Meet Needs	Ever Physical Abuse	Physical Abuse > 10×	Ever Sexual Abuse
Very low birthweight	= 1 if birthweight was less than 1,500 grams, = 0 otherwise	0.022	0.024	0.020	0.019	0.023	0.019	0.022	0.025
Low birth-weight[a]	= 1 if birthweight was between 1,500–2,499 grams, = 0 otherwise	0.088	0.084	0.096	0.085	0.093	0.088	0.095	0.115
Normal birthweight	= 1 if birthweight was greater than or equal to 2,500 grams, = 0 otherwise	0.890	0.892	0.884	0.896	0.884	0.893	0.882	0.860
Child bad tempered	= 1 if the parent reported that respondent was bad tempered at Wave I, = 0 otherwise	0.302	0.270	0.330	0.357	0.383	0.356	0.376	0.379
Child learning problems	= 1 if the parent reported that respondent had learning problems at Wave I, = 0 otherwise	0.112	0.107	0.122	0.101	0.170	0.109	0.095	0.154
Number of observations		13,509	6,398	5,357	1,113	1,528	3,941	846	650

[a] Omitted category.

Notes: The models also include binary variables for missing data on race, Hispanic ethnicity, U.S.-born status, parental religiosity, first child, birth weight, number of siblings, parental welfare status, mother's education, jailed father, family income, and mother's age at respondent's birth. Standard errors are in brackets.

A *, **, *** indicates significance at 90 percent, 95 percent, 99 percent respectively.

Table 3

Effects of Any Maltreatment on Criminal Activity

(Using > 10X cutoff for physical abuse and being left alone when should have been supervised. Each coefficient is from a separate regression.

	OLS Short List of Controls	OLS Short List of Controls with Behavioral Problems	OLS Full List of Controls	OLS Full List of Controls with School FE	OLS Full List of Controls with School FE—Males	OLS Full List of Controls with School FE—Females
Any nondrug	0.112*** (0.008)	0.106*** (0.008)	0.104*** (0.008)	0.105*** (0.008)	0.151*** (0.014)	0.061*** (0.010)
Armed robbery	0.024*** (0.004)	0.023*** (0.004)	0.022*** (0.004)	0.022*** (0.004)	0.036*** (0.007)	0.008** (0.004)
Burglary	0.027*** (0.004)	0.027*** (0.004)	0.026*** (0.004)	0.025*** (0.004)	0.041*** (0.007)	0.009** (0.004)
Damaged property	0.060*** (0.007)	0.058*** (0.007)	0.058*** (0.007)	0.059*** (0.007)	0.084*** (0.011)	0.035*** (0.007)
Assault	0.058*** (0.006)	0.053*** (0.006)	0.049*** (0.006)	0.051*** (0.006)	0.080*** (0.011)	0.022*** (0.007)
Theft > $50	0.034*** (0.004)	0.032*** (0.004)	0.031*** (0.005)	0.031*** (0.005)	0.051*** (0.008)	0.012** (0.005)
Any hard drug	0.067*** (0.007)	0.062*** (0.007)	0.061*** (0.007)	0.061*** (0.008)	0.081*** (0.012)	0.044*** (0.010)
Crime victim	0.081*** (0.007)	0.076*** (0.007)	0.070*** (0.007)	0.071*** (0.007)	0.098*** (0.012)	0.039*** (0.008)
Ever convicted	0.056*** (0.006)	0.051*** (0.006)	0.043*** (0.006)	0.044*** (0.006)	0.076*** (0.011)	0.011** (0.005)

Notes: Robust standard errors in parentheses.

A *, **, *** indicates significance at 90 percent, 95 percent, 99 percent respectively.

The "short list" of controls includes: child age, gender, race, ethnicity, and child U.S.-born. The behavioral problem variables include whether the parent reports that the child has learning problems at Wave I, learning problems missing; whether the child is reported to be "bad tempered" at Wave I, bad tempered missing; whether the child had ADHD symptoms between ages five and 12. The "full" list of controls include: the child's birth weight (<1500, 1500–2500, >2500 grams, missing); whether the child is the first born, first born missing; whether the parent reports that the child has learning problems at Wave I, learning problems missing; whether the child is reported to be "bad tempered" at Wave I, bad tempered missing ; whether the child had ADHD symptoms between ages five and 12; mother's education (<highschool, highschool, >highschool, mother's education missing); mother's age at birth (<= 19, 20–30, 31–40, 41 +, missing); parents' religion (Catholic, Baptist, Other Protestant, Other, No religion, religion missing); number of siblings (none, one, two, three, four or more, missing); father present (biological, step, and father information missing); father ever jailed (and ever jailed missing); family on AFDC in Wave I (and missing); poverty status (<= 0.5*poverty, 0.51–1*poverty, 1.01–2*poverty, >2*poverty, poverty information missing), and state fixed effects. The sample sizes range from 13,195 to 13,246 for the OLS models in Column 4, from 6,053 to 6,086 for the male models in Column 5, and from 7,136 to 7,160 for the female models in Column 6.

Table 4

Effects of Any Maltreatment on Criminal Activity—OLS Models with Sibling and Twin Samples

(Using > 10X cutoff for physical abuse and being left alone when should have been supervised. Each coefficient is from a separate regression.

	OLS Twins Sample Full List Controls	OLS Sibling Sample Full List Controls	OLS Sibling Sample Full Controls Males	OLS Sibling Sample Full Controls Females
Any nondrug	0.160*** (0.035)	0.111*** (0.022)	0.105** (0.044)	0.104*** (0.036)
Armed robbery	0.023 (0.015)	0.020** (0.008)	0.046** (0.019)	0.019 (0.015)
Burglary	0.047*** (0.017)	0.028*** (0.011)	0.026 (0.021)	0.042** (0.018)
Damaged property	0.087*** (0.028)	0.070*** (0.017)	0.060* (0.037)	0.061*** (0.026)
Assault	0.097*** (0.027)	0.052*** (0.015)	0.072** (0.034)	0.005 (0.020)
Theft > $50	0.040** (0.017)	0.027*** (0.012)	0.020 (0.024)	0.038** (0.019)
Any hard drug	0.066** (0.30)	0.026 (0.018)	−0.007 (0.037)	0.012 (0.028)
Crime victim	0.107*** (0.030)	0.066*** (0.018)	0.088** (0.039)	0.047* (0.028)
Ever convicted	0.024 (0.023)	0.018 (0.014)	0.016 (0.031)	−0.004 (0.015)

Notes: Robust standard errors in parentheses.

A *, **, *** indicates significance at 90 percent, 95 percent, 99 percent respectively.

The sample sizes range from 926 to 928 in Column 1, from 2,211 to 2,115 in Column 2, from 655 to 656 in Column 3, and from 828 to 830 in Column 4.

Table 5

Effects of Any Maltreatment on Criminal Activity—Fixed Effects Estimates with Twin and Sibling Samples

(Using > 10X cutoff for physical abuse and being left alone when should have been supervised. Each coefficient is from a separate regression.

	Twin Fixed Effects	Sibling Fixed Effects	Sibling Fixed Effects Males	Sibling Fixed Effects Females
Any nondrug	0.144*** (0.045)	0.086*** (0.030)	0.119* (0.063)	0.110** (0.053)
Armed robbery	0.011 (0.017)	0.008 (0.013)	0.034 (0.028)	0.026 (0.016)
Burglary	0.047*** (0.014)	0.018* (0.010)	0.011 (0.022)	0.052** (0.022)
Damaged property	0.089** (0.036)	0.058** (0.024)	0.081 (0.053)	0.057 (0.035)
Assault	0.067** (0.031)	0.042** (0.021)	0.064 (0.046)	0.002 (0.031)
Theft > $50	0.039* (0.020)	0.006 (0.016)	−0.011 (0.030)	0.026 (0.024)
Any hard Drug	0.083** (0.034)	0.005 (0.024)	0.040 (0.048)	−0.021 (0.035)
Crime victim	0.080** (0.037)	0.066** (0.025)	0.061 (0.051)	0.051 (0.038)
Ever convicted	0.023 (0.031)	−0.006 (0.021)	−0.038 (0.046)	0.009 (0.022)

Notes: Robust standard errors in parentheses.

A *, **, *** indicates significance at 90 percent, 95 percent, 99 percent respectively.

The sample sizes range from 926 to 928 in Column 1, from 2,211 to 2,115 in Column 2, from 655 to 666 in Column 3, and from 828 to 830 in Column 4. Twin fixed effects models include child gender and indicators for very low birth weight, low birth weight, ADHD, and parental reports about whether the child was bad tempered and had learning problems as of Wave I. Sibling fixed effects models also include indicators for age.

Table 6

Effects of Different Types of Maltreatment on Outcomes—Sibling FE Models

(Each cell of the table shows the coefficient on the maltreatment indicator from a different regression).									
Any Nondrug	**Armed Robbery**	**Burglary**	**Damaged Property**	**Assault**	**Theft > $50**	**Any Hard Drug**	**Victimized**	**Ever Convicted**
1. Any maltreatment using > 10 cutoffs for physical maltreatment and being left alone									
0.086*** (0.030)	0.008 (0.013)	0.018* (0.010)	0.058** (0.024)	0.042** (0.021)	0.006 (0.016)	0.005 (0.024)	0.067*** (0.025)	−0.006 (0.021)
2. Ever any maltreatment									
0.055** (0.022)	−0.001 (0.008)	0.012 (0.008)	0.053*** (0.017)	0.019 (0.015)	0.015 (0.011)	0.029 (0.018)	0.035* (0.018)	−0.013 (0.015)
3. Maltreatment = 1 if Parents Ever Left Alone When Should Have Been Supervised									
0.004 (0.023)	−0.011 (0.008)	0.004 (0.009)	0.010 (0.018)	0.013 (0.016)	0.001 (0.012)	0.039** (0.018)	0.027 (0.019)	−0.008 (0.015)
4. Maltreatment = 1 if parents left alone when should have been supervised > 10 times									
0.013 (0.043)	−0.026* (0.015)	−0.019 (0.016)	−0.001 (0.033)	0.022 (0.029)	0.033 (0.021)	0.024 (0.034)	0.053 (0.035)	0.014 (0.028)
5. Maltreatment = 1 if parents ever failed to meet basic needs									
0.051 (0.034)	0.018 (0.012)	0.014 (0.013)	0.044* (0.027)	0.055** (0.023)	−0.004 (0.017)	−0.004 (0.027)	0.063** (0.028)	−0.017 (0.022)
6. Maltreatment = 1 if parents ever struck, etc.									
0.087*** (0.025)	0.015* (0.009)	0.019** (0.009)	0.065*** (0.019)	0.031* (0.017)	0.014 (0.013)	0.036* (0.020)	0.036* (0.021)	0.001 (0.016)
7. Maltreatment = 1 if parents struck, etc. > 10 times									
0.216*** (0.048)	0.023 (0.018)	0.013 (0.019)	0.156*** (0.038)	0.051 (0.034)	−0.025 (0.025)	0.040 (0.039)	0.073* (0.041)	0.021 (0.032)
8. Maltreatment = 1 if sexual maltreatment									
0.245*** (0.047)	0.083*** (0.017)	0.098*** (0.018)	0.121*** (0.038)	0.120*** (0.033)	0.098*** (0.024)	0.061 (0.038)	0.118*** (0.040)	0.027 (0.032)

Notes: Robust standard errors in parentheses.

A *, **, *** indicates significance at 90 percent, 95 percent, 99 percent respectively.

Table 7

Sibling FE Models with Multiple Experiences of Maltreatment

Variable	Any Nondrug	Armed Robbery	Burglary	Damaged Property	Assault	Theft > $50	Other Hard Drug	Victim	Ever Convicted
Only one maltreatment	0.034 (0.034)	−0.012 (0.012)	0.010 (0.013)	0.021 (0.028)	0.008 (0.021)	−0.017 (0.018)	−0.016 (0.025)	0.048* (0.026)	−0.024 (0.022)
Two types of maltreatment	0.183** (0.061)	0.075** (0.032)	0.039 (0.030)	0.128*** (0.049)	0.117** (0.047)	0.054** (0.031)	0.040 (0.051)	0.071 (0.054)	0.036 (0.039)
Three or more types of maltreatment	0.403*** (0.104)	0.008 (0.011)	0.060 (0.049)	0.208** (0.087)	0.196** (0.083)	0.101 (0.096)	0.183* (0.111)	0.350*** (0.098)	0.032 (0.108)

Notes: Robust standard errors in parentheses.

A *, **, *** indicates significance at 90 percent, 95 percent, 99 percent respectively.

Table 8

Estimated Annual Costs of Maltreatment in Terms of Increases in Costs of Crime

Crime	Cost Per Crime ($)	Prevalence in Add Health	Estimated Effect Abuse Twin FE	Annual Per Person Cost of Abuse ($)	Total Cost of Abuse (million $)
A. Costs from Locher and Moretti (2004)					
Assault	13,884	0.071	0.042	134	5,226
Robbery	13,139	0.020	0.008	24	936
Burglary	1,382	0.019	0.018	6	234
Theft > $50	277	0.033	0.006	0.38	15
					Sum: 6,411
B. Costs from Cohen (2004)					
Assault	81,900	0.071	0.042	791	30,849
Robbery	271,440	0.020	0.008	499	19,461
Burglary	29,250	0.019	0.018	121	4,719
					Sum: 5,029

Notes: Lochner and Moretti (2004) present estimates of the social costs of crime and include incarceration costs. Cohen (2004) derives estimates from a survey asking willingness to pay for crime prevention. Estimated effects of abuse on probability of crime are from Table 5, Column 2. Annual per person costs are obtained by multiplying the cost by the estimated effect, and then multiplying by the incidence of any abuse (0.23). Total cost of abuse is estimated based on 39 million people aged 20–29 in 2000. Costs converted to millions $2,006.

Table A1

Regressions of Differences in Twin Reports of Maltreatment on Differences in Reporting of Other Outcomes

	Ever Any Maltreatment	Any Maltreatment > 10X	Ever Left Alone	Left Alone > 10X	Ever failed to meet needs	Ever Physical Abuse	Physical Abuse > 10X	Ever Sexual Abuse
1. Differences in reports about whether father had ever been in jail as of Wave I								
Difference	0.117* (0.062)	0.060 (0.065)	0.049 (0.038)	0.078 (0.067)	0.051 (0.056)	0.049 (0.035)	0.105 (0.071)	−0.030 (0.043)
2. Differences in reports about how often twins fight with each other								
Difference	0.037 (0.036)	0.022 (0.034)	0.001 (0.024)	0.035 (0.038)	−0.022 (0.024)	0.020 (0.018)	0.055* (0.032)	−0.012 (0.019)
3. Differences in reports about how far they must travel to see each other								
Difference	0.027 (0.056)	0.050 (0.050)	0.007 (0.036)	0.034 (0.058)	−0.032 (0.033)	0.013 (0.027)	0.013 (0.048)	0.007 (0.029)
4. Differences in reports about how often they talk to each other								
Difference	−0.033 (0.055)	−0.031 (0.050)	0.028 (0.037)	−0.014 (0.059)	−0.068* (0.037)	0.006 (0.025)	−0.040 (0.047)	−0.009 (0.022)

Notes: Robust standard errors in parentheses.

A *, **, *** indicates significance at 90 percent, 95 percent, 99 percent respectively.

Table A2

Definitions and Means of All Explanatory Variables Included in Regressions by Any Maltreatment and Type of Maltreatment

Variable Name	Definition	Full Sample	Never Any Maltreatment	Ever Left Alone	Left Alone > 10X	Ever Failed to Meet Needs	Ever Physical Abuse	Physical Abuse > 10X	Ever Sexual Abuse
Age 18[a]	= 1 if 18 years old, = 0 otherwise	0.010	0.009	0.012	0.017	0.010	0.011	0.015	0.008
Age 19	= 1 if 19 years old, = 0 otherwise	0.095	0.090	0.104	0.093	0.093	0.091	0.070	0.114
Age 20	= 1 if 20 years old, = 0 otherwise	0.132	0.123	0.145	0.152	0.156	0.134	0.143	0.126
Age 21	= 1 if 21 years old, = 0 otherwise	0.160	0.159	0.163	0.158	0.168	0.151	0.124	0.151
Age 22	= 1 if 22 years old, = 0 otherwise	0.190	0.186	0.189	0.166	0.182	0.201	0.197	0.182
Age 23	= 1 if 23 years old, = 0 otherwise	0.192	0.198	0.187	0.208	0.179	0.191	0.195	0.197
Age 24	= 1 if 24 years old, = 0 otherwise	0.160	0.170	0.145	0.150	0.141	0.160	0.194	0.152
Age 25	= 1 if 25 years old, = 0 otherwise	0.052	0.055	0.048	0.050	0.058	0.054	0.051	0.060
Age 26 +	= 1 if 26 years old or older, = 0 otherwise	0.009	0.010	0.008	0.006	0.012	0.006	0.011	0.011
Male	= 1 if male, = 0 otherwise	0.459	0.436	0.491	0.495	0.567	0.489	0.482	0.432
White	= 1 if white, = 0 otherwise	0.667	0.681	0.654	0.657	0.569	0.649	0.626	0.596
Black	= 1 if Black, = 0 otherwise	0.226	0.233	0.224	0.206	0.287	0.215	0.223	0.284
Other race[a]	= 1 if other race, = 0 otherwise	0.107	0.087	0.122	0.138	0.144	0.136	0.150	0.120
Hispanic	= 1 if Hispanic, = 0 otherwise	0.159	0.146	0.170	0.150	0.201	0.189	0.176	0.204
U.S.-born	= 1 if born in the United States, = 0 otherwise	0.922	0.931	0.912	0.908	0.904	0.906	0.904	0.922
Mother Ed < HS[a]	= 1 if the mother has less than high school degree, = 0 otherwise	0.157	0.151	0.163	0.165	0.223	0.174	0.183	0.223

Variable Name	Definition	Full Sample	Never Any Maltreatment	Ever Left Alone	Left Alone > 10X	Ever Failed to Meet Needs	Ever Physical Abuse	Physical Abuse > 10X	Ever Sexual Abuse
Mother Ed = HS	= 1 if the mother has high school degree, = 0 otherwise	0.351	0.350	0.356	0.329	0.378	0.342	0.304	0.341
Mother Ed > HS	= 1 if the mother has more than high school degree, = 0 otherwise	0.492	0.499	0.481	0.506	0.399	0.484	0.514	0.436
Jailed father	= 1 if the biological father was ever jailed, = 0 otherwise	0.144	0.103	0.189	0.241	0.222	0.205	0.245	0.246
Catholic	= 1 if parents are Catholic, = 0 otherwise	0.287	0.272	0.297	0.287	0.284	0.313	0.268	0.284
Baptist	= 1 if parents are Baptist, = 0 otherwise	0.237	0.255	0.224	0.203	0.286	0.207	0.213	0.286
Other Protestant	= 1 if parents are other Protestant, = 0 otherwise	0.244	0.253	0.238	0.248	0.200	0.229	0.230	0.176
Other Religion[a]	= 1 if parents are other religion, = 0 otherwise	0.169	0.165	0.170	0.182	0.157	0.181	0.220	0.172
No religion	= 1 if parents believe in no religion, = 0 otherwise	0.063	0.056	0.070	0.080	0.074	0.070	0.070	0.082
First child	= 1 if the person is the first child, = 0 otherwise	0.498	0.480	0.518	0.561	0.495	0.529	0.564	0.529
Welfare	= 1 if parents were on welfare during Wave I, = 0 otherwise	0.085	0.077	0.090	0.089	0.161	0.098	0.100	0.160
Very low birthweight	= 1 if birth weight was less than 1500 grams, = 0 otherwise	0.022	0.024	0.020	0.019	0.023	0.019	0.022	0.025
Low birthweight	= 1 if birth weight was between 15.00 and 25.00 grams, = 0 otherwise	0.088	0.084	0.096	0.085	0.093	0.088	0.095	0.115
Normal birthweight[a]	= 1 if birth weight is greater than 2500 grams, = 0 otherwise	0.890	0.892	0.884	0.896	0.884	0.893	0.882	0.860
Sibling 0[a]	= 1 if no siblings, = 0 otherwise	0.196	0.186	0.213	0.267	0.220	0.205	0.231	0.216
Sibling 1	= 1 if one sibling, = 0 otherwise	0.359	0.363	0.351	0.364	0.320	0.356	0.325	0.342

Variable Name	Definition	Full Sample	Never Any Maltreatment	Ever Left Alone	Left Alone > 10X	Ever Failed to Meet Needs	Ever Physical Abuse	Physical Abuse > 10X	Ever Sexual Abuse
Sibling 2	= 1 if two siblings, = 0 otherwise	0.248	0.244	0.250	0.223	0.240	0.244	0.235	0.231
Sibling 3	= 1 if three sibling, = 0 otherwise	0.116	0.121	0.113	0.092	0.122	0.113	0.125	0.114
Sibling 4 +	= 1 if four or more siblings, = 0 otherwise	0.081	0.085	0.073	0.053	0.098	0.082	0.083	0.097
Income < 50 percent	= 1 if parental income was less 50 percent of poverty line at Wave I, = 0 otherwise	0.055	0.052	0.057	0.063	0.097	0.063	0.068	0.085
Income 50– 100 percent	= 1 if parental income was between 50 percent and 100 percent of poverty line at Wave I, = 0 otherwise	0.082	0.080	0.085	0.081	0.127	0.086	0.090	0.141
Income 100– 200 percent	= 1 if parental income was between 100 percent and 200 percent of poverty line at Wave I, = 0 otherwise	0.183	0.172	0.201	0.187	0.246	0.200	0.205	0.259
Income 200 percent[a]	= 1 if parental income was greater than 200 percent of poverty line at Wave I, = 0 otherwise	0.680	0.696	0.657	0.669	0.530	0.652	0.637	0.514
Biological father	= 1 if biological father was present at Wave I, = 0 otherwise	0.589	0.625	0.542	0.466	0.474	0.555	0.557	0.416
Stepfather	= 1 if step father was present at Wave I, = 0 otherwise	0.109	0.097	0.121	0.142	0.103	0.122	0.125	0.146
No Father[a]	= 1 if no father was present at Wave I, = 0 otherwise	0.303	0.278	0.337	0.393	0.424	0.323	0.318	0.439
Mother age at birth 19[a]	Mother's age at respondent's birth was 19 or less, = 0 otherwise	0.101	0.092	0.115	0.134	0.144	0.119	0.118	0.156
Mother age at birth 20– 30	Mother's age at respondent's birth was between 20 and 30, = 0 otherwise	0.708	0.705	0.708	0.712	0.714	0.712	0.722	0.691
Mother age at birth 31– 40	Mother's age at respondent's birth was	0.181	0.194	0.168	0.148	0.132	0.160	0.146	0.140

Variable Name	Definition	Full Sample	Never Any Maltreatment	Ever Left Alone	Left Alone > 10X	Ever Failed to Meet Needs	Ever Physical Abuse	Physical Abuse > 10X	Ever Sexual Abuse
	between 31–40, = 0 otherwise								
Mother age at birth 40 +	Mother's age at respondent's birth was greater than 40, = 0 otherwise	0.009	0.009	0.008	0.007	0.010	0.010	0.014	0.014

[a] Omitted category.

Notes: The models also include binary variables for the missing data on race, Hispanic Ethnicity, U.S.-born status, parental religiosity, first child, birth weight, number of siblings, parental welfare status, mother's education, jailed father, family income, and mother's age at respondent's birth.

Table A3

Full OLS Results for Models Corresponding to Column 3 of Table 3.

Variable	Any Nondrug	Armed Robbery	Burglary	Damaged Property	Attacked Someone	Theft > $50	Other Hard Drug	Victim	Ever Convicted
Any abuse	0.104*** (0.008)	0.022*** (0.004)	0.026*** (0.004)	0.058*** (0.007)	0.049*** (0.006)	0.031*** (0.005)	0.061*** (0.007)	0.070*** (0.007)	0.043*** (0.006)
Age 19	0.051 (0.034)	0.009 (0.013)	−0.016 (0.018)	0.026 (0.029)	0.016 (0.024)	−0.024 (0.022)	−0.041 (0.034)	0.049* (0.025)	0.014 (0.018)
Age 20	0.011 (0.033)	0.005 (0.013)	−0.014 (0.018)	−0.004 (0.028)	−0.010 (0.023)	−0.025 (0.022)	−0.039 (0.033)	0.012 (0.025)	0.014 (0.018)
Age 21	−0.006 (0.033)	0.004 (0.013)	−0.025 (0.017)	−0.023 (0.028)	0.005 (0.023)	−0.040* (0.022)	−0.064* (0.033)	0.020 (0.024)	0.011 (0.018)
Age 22	−0.021 (0.033)	−0.002 (0.013)	−0.027 (0.017)	−0.033 (0.027)	−0.011 (0.023)	−0.038* (0.022)	−0.065** (0.033)	0.013 (0.024)	0.018 (0.018)
Age 23	−0.039 (0.033)	−0.005 (0.013)	−0.027 (0.017)	−0.050* (0.027)	−0.009 (0.023)	−0.048** (0.022)	−0.071** (0.033)	0.009 (0.024)	0.016 (0.018)
Age 24	−0.065** (0.033)	−0.004 (0.013)	−0.033* (0.017)	−0.060** (0.027)	−0.025 (0.023)	−0.048** (0.022)	−0.081** (0.033)	−0.012 (0.024)	0.013 (0.018)
Age 25	−0.072** (0.035)	−0.015 (0.013)	−0.042* (0.017)	−0.071** (0.028)	−0.024 (0.025)	−0.067*** (0.022)	−0.096*** (0.034)	−0.005 (0.026)	0.024 (0.020)
Age 26 +	−0.071 (0.046)	−0.002 (0.019)	−0.039* (0.019)	−0.080** (0.033)	0.001 (0.037)	−0.057*** (0.026)	−0.110*** (0.039)	0.007 (0.041)	−0.008 (0.027)
Male	0.153*** (0.006)	0.022*** (0.003)	0.019*** (0.002)	0.096*** (0.005)	0.076*** (0.005)	0.027*** (0.003)	0.054*** (0.006)	0.098*** (0.005)	0.086*** (0.004)
White	−0.027* (0.013)	0.001 (0.004)	−0.008 (0.005)	−0.007 (0.010)	−0.016* (0.009)	−0.006 (0.007)	0.036*** (0.011)	−0.017 (0.011)	0.001 (0.008)
Black	0.025* (0.015)	0.023*** (0.006)	0.009 (0.006)	−0.015 (0.011)	0.033*** (0.011)	0.010 (0.008)	−0.069*** (0.011)	0.039*** (0.013)	−0.007 (0.009)
Hispanic	−0.000 (0.010)	0.004 (0.004)	0.000 (0.004)	−0.021*** (0.008)	0.017** (0.008)	0.001 (0.005)	−0.017* (0.010)	0.018** (0.009)	−0.009 (0.007)
U.S.-born	0.021 (0.013)	0.007* (0.004)	0.003 (0.004)	0.007 (0.009)	0.025*** (0.009)	−0.001 (0.007)	0.045*** (0.010)	0.045*** (0.010)	0.038*** (0.006)
Mother ed = HS	−0.010 (0.010)	0.003 (0.004)	0.002 (0.004)	−0.006 (0.008)	−0.005 (0.008)	−0.008 (0.005)	0.015* (0.008)	−0.018* (0.009)	−0.014* (0.007)
Mother ed > HS	−0.002 (0.010)	0.004 (0.004)	0.000 (0.004)	0.008 (0.008)	−0.013 (0.008)	−0.005 (0.005)	0.038*** (0.009)	−0.019** (0.009)	−0.011 (0.007)
Jailed father	0.035*** (0.010)	0.012*** (0.005)	0.007* (0.004)	0.017** (0.008)	0.026*** (0.008)	0.011* (0.006)	0.032*** (0.009)	0.032*** (0.009)	0.049*** (0.008)
Catholic	0.020* (0.011)	0.001 (0.004)	0.002 (0.004)	0.011 (0.009)	0.007 (0.007)	0.003 (0.006)	−0.001 (0.010)	−0.004 (0.009)	0.004 (0.007)
Baptist	0.003 (0.011)	−0.000 (0.004)	−0.008* (0.004)	−0.014* (0.008)	0.017** (0.008)	−0.011** (0.005)	−0.017* (0.009)	0.014 (0.010)	0.008 (0.007)
Other protestant	0.017 (0.011)	0.001 (0.004)	0.000 (0.004)	−0.004 (0.008)	0.017** (0.007)	−0.004 (0.005)	−0.003 (0.010)	0.007 (0.009)	0.011 (0.007)
No religion	0.019 (0.016)	−0.010* (0.005)	−0.001 (0.006)	0.005 (0.013)	0.031*** (0.011)	−0.005 (0.008)	0.012 (0.015)	0.025* (0.013)	0.020* (0.011)
First child	0.004 (0.008)	−0.002 (0.003)	0.001 (0.003)	0.010* (0.006)	0.002 (0.005)	0.001 (0.004)	−0.006 (0.007)	0.004 (0.006)	−0.002 (0.005)
Very low birthweight	−0.023 (0.023)	−0.003 (0.009)	−0.007 (0.008)	0.010 (0.018)	−0.013 (0.017)	−0.028*** (0.006)	−0.023 (0.018)	−0.001 (0.021)	0.009 (0.016)
Low birthweight	−0.013 (0.012)	0.003 (0.005)	−0.003 (0.004)	−0.003 (0.009)	−0.002 (0.009)	−0.008 (0.005)	−0.009 (0.010)	−0.011 (0.010)	0.007 (0.008)
Child learning problems	0.001 (0.012)	0.001 (0.005)	0.004 (0.005)	−0.030*** (0.008)	0.028*** (0.009)	−0.000 (0.006)	−0.017* (0.010)	0.039*** (0.011)	0.006 (0.008)
Child bad tempered	0.030*** (0.008)	0.003 (0.003)	−0.002 (0.003)	0.016*** (0.006)	0.021*** (0.006)	0.005 (0.004)	0.032*** (0.007)	0.036*** (0.007)	0.026*** (0.005)
ADHD	0.062*** (0.014)	0.018*** (0.007)	0.009 (0.006)	0.035*** (0.011)	0.038*** (0.011)	0.028*** (0.008)	0.049*** (0.013)	0.034*** (0.012)	0.054*** (0.011)
Sibling 1	−0.005 (0.010)	−0.004 (0.004)	0.002 (0.004)	0.001 (0.008)	0.002 (0.007)	0.001 (0.005)	−0.003 (0.009)	−0.004 (0.008)	−0.016** (0.007)
Sibling 2	0.001 (0.012)	−0.003 (0.005)	0.002 (0.004)	0.009 (0.009)	0.007 (0.008)	0.003 (0.006)	−0.014 (0.010)	0.006 (0.010)	−0.013* (0.008)

Variable	Any Nondrug	Armed Robbery	Burglary	Damaged Property	Attacked Someone	Theft > $50	Other Hard Drug	Victim	Ever Convicted
Sibling 3	−0.001 (0.014)	−0.010* (0.005)	0.002 (0.005)	0.004 (0.011)	0.012 (0.010)	−0.003 (0.007)	−0.021* (0.012)	−0.006 (0.011)	−0.015 (0.009)
Sibling 4 +	0.000 (0.015)	−0.000 (0.007)	−0.000 (0.006)	0.002 (0.011)	0.015 (0.011)	0.006 (0.008)	−0.017 (0.013)	0.031** (0.014)	0.001 (0.011)
Welfare	0.003 (0.014)	−0.002 (0.006)	−0.002 (0.005)	0.005 (0.010)	−0.006 (0.011)	0.007 (0.007)	−0.016 (0.010)	−0.002 (0.013)	0.000 (0.009)
Income <50 percent	0.015 (0.021)	0.001 (0.009)	−0.006 (0.009)	0.015 (0.015)	0.008 (0.016)	0.001 (0.010)	−0.017 (0.015)	0.007 (0.019)	0.009 (0.014)
Income 50–100 percent	−0.018 (0.019)	−0.005 (0.008)	−0.009 (0.008)	−0.013 (0.013)	−0.009 (0.015)	−0.008 (0.009)	−0.013 (0.014)	−0.018 (0.017)	−0.005 (0.012)
Income 100–200 percent	0.005 (0.018)	−0.006 (0.008)	−0.005 (0.007)	0.011 (0.013)	−0.008 (0.014)	0.005 (0.009)	0.007 (0.014)	−0.007 (0.016)	0.002 (0.012)
Biological Father	−0.186*** (0.064)	−0.042 (0.032)	0.006 (0.006)	−0.037 (0.044)	−0.172*** (0.057)	−0.020 (0.029)	0.005 (0.042)	−0.162*** (0.062)	0.013 (0.032)
Stepfather	−0.191*** (0.064)	−0.046 (0.033)	0.006 (0.007)	−0.041 (0.045)	−0.167*** (0.057)	−0.014 (0.029)	0.038 (0.043)	−0.143** (0.062)	0.020 (0.032)
Mother age at birth20–30	−0.009 (0.013)	−0.002 (0.005)	−0.001 (0.005)	−0.000 (0.009)	−0.015 (0.010)	−0.002 (0.006)	0.030*** (0.010)	−0.018 (0.012)	0.001 (0.009)
Mother age at birth31–40	−0.000 (0.015)	−0.001 (0.006)	0.001 (0.006)	0.012 (0.012)	−0.019* (0.011)	−0.002 (0.008)	0.050*** (0.012)	−0.030** (0.013)	−0.003 (0.010)
Mother age at birth40 +	−0.055 (0.039)	−0.003 (0.017)	0.001 (0.016)	−0.022 (0.028)	−0.043* (0.026)	−0.019 (0.017)	0.023 (0.030)	−0.075*** (0.028)	−0.035 (0.021)
Constant	0.056 (0.078)	0.037 (0.037)	0.021 (0.022)	0.023 (0.059)	0.112* (0.066)	0.065* (0.039)	−0.149** (0.060)	0.069 (0.071)	−0.069 (0.047)
Number of observations	13,452	13,482	13,482	13,453	13,489	13,478	13,502	13,486	13,493
R-squared	0.08	0.03	0.02	0.06	0.06	0.02	0.06	0.07	0.07

Note: Robust standard errors in parentheses.

A *, **, *** indicates significance at 90 percent, 95 percent, *** 99 percent respectively.

Note: Model also includes state fixed effects.