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DOES CHILD ABUSE CAUSE CRIME?

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ABSTRACT

Child maltreatment, which includes both child abuse and child neglect, is a major social problem. This paper focuses on measuring the effects 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. Our work addresses many limitations of the existing literature on child maltreatment. First, we use a large national sample, and investigate different types of abuse in a similar framework. Second, we pay careful attention to identifying the causal impact of abuse, by using a variety of statistical methods that make differing assumptions. These methods include: Ordinary Least Squares (OLS), propensity score matching estimators, and twin fixed effects. Finally, we examine the extent to which the effects of maltreatment vary with socio-economic status (SES), gender, and the severity of the maltreatment. We find that maltreatment approximately doubles the probability of engaging in many types of crime. Low SES children are both more likely to be mistreated and suffer more damaging effects. Boys are at greater risk than girls, at least in terms of increased propensity to commit crime. Sexual abuse appears to have the largest negative effects, perhaps justifying the emphasis on this type of abuse in the literature. Finally, the probability of engaging in crime increases with the experience of multiple forms of maltreatment as well as the experience of Child Protective Services (CPS) investigation.

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1. Introduction

Child maltreatment, which includes both child abuse and child neglect, is a major social problem. According to the U.S. Department of Health and Human Services (1996), over a million children are victims of maltreatment annually. Over half a million children suffer serious injuries, and about 1,500 children die, making child maltreatment the leading cause of deaths from injuries in children over a year old (Institute of Medicine, 1999). In addition to this appalling immediate toll, child abuse is thought to have many harmful long-term consequences.

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. The link between child maltreatment and crime is a staple of the news media. For example, the media noted that John Muhammad, the Washington D.C. sniper, was "regularly and severely beaten as a child by several relatives, including an uncle who beat another child to death…" (CNN, February 10, 2004). Child neglect is also often implicated. Neighbors of a nine-year-old who stabbed her best friend to death were reported to have "angrily blamed the young attacker's absent, alcoholic mother yesterday for the Memorial Day tragedy" (The New York Post, June 1, 2005). Yet there is little hard evidence available about the effects of child maltreatment on crime, and there is criticism of the extent to which a "cycle of violence" has been substantiated in the literature (c.f. Widom, 1989a).

Our work addresses many limitations of the existing literature on child maltreatment. 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 abuse compare (Rebellon and Van Gundy, 2005). We will examine the effects of different types of abuse in a similar framework. Second, most studies are based on clinical data and convenience samples. In contrast, we use data from a national survey that includes a large "control" group of children who were neither maltreated nor committed crime.[1] To our knowledge, this is the first study of the effect of child abuse on future criminality in the economics literature.

Third, the NRC 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, page 209). We attack the problem of isolating the causal effects of maltreatment by comparing estimates obtained using several different estimation methods all of which rely on differing assumptions. These methods include: Ordinary Least Squares (OLS), propensity score matching estimators, and twin fixed effects. We will show that the estimates are remarkably similar, regardless of estimation method.

Fourth, the NRC noted that while poor families are over-represented in the caseloads of child protective services, there has been little investigation of the extent to which the consequences of maltreatment vary with socio-economic status (SES). Higher SES children have better outcomes in many respects (c.f. Case, Lubotsky and Paxson, 2002; Currie and Stabile, 2003), and it is possible that high SES is also protective against the effects of abuse. We look at this question and at whether the relationship between maltreatment and crime differs

[1] Administrative data on maltreatment and criminality capture only a fraction of all abuses and criminal behaviors because not all maltreatment or criminal activity are reported to or captured by government agencies. Administrative data sets often also contain only limited information on important mediating factors such as family and socio-economic background. Furthermore, families about whom there are official records may be those more likely to come to the attention of official agencies, and thus may be an unrepresentative sample of families in which child abuse occurs (Smith and Thornberry, 1995). Rebellon and Van Gundy (2005) underscore the fact that little previous research has employed nationally representative samples.

for males and females. Most research has concentrated on males primarily because of lack of data and because males commit most of the serious predatory and violent offenses. This has resulted in a gap in our understanding of the risk factors for criminal behavior for males versus females, which may hamper efforts to develop differential preventive strategies (Farrington and Painter, 2004).

While there are limitations of using large national data sets (primarily, the relative crudeness of the available measures of maltreatment), our work is a potentially important complement to small-scale studies that use more detailed measures. The key questions we address, including the identification of causal effects of maltreatment and potential differences by socio-economic status, are unlikely to be settled by research using small samples of children who are suspected of having been abused or who have already committed crimes. Moreover, even prospective longitudinal studies must often rely on proxy measures of abuse (such as harsh parenting) given the legal and moral requirement to report and intervene if maltreatment is known to have occurred.

We find remarkably large and robust effects of maltreatment on a range of different measures of criminal activity. Being maltreated approximately doubles the probability of engaging in many types of crime. Low SES children are both at higher risk of maltreatment, and suffer more negative effects. Boys appear to be at greater risk than girls, at least in terms of increased propensity to some types of crimes such as assault, and in terms of propensity to be convicted of crimes. Finally, sexual abuse appears to have the largest negative effects, perhaps justifying the emphasis on this type of abuse in the literature.

In Section 2, we provide a brief discussion of the mechanisms through which abuse may cause crime later in life and summarize the literature on the subject. We then describe our data

in Section 3. Section 4 discusses the methodology. The results are presented in Section 5. Section 6 concludes the paper.

2. Background

a) Why Would Maltreatment Cause Crime?

Social scientists have developed a number of theories about the relationship between maltreatment and crime. Brezina (1998) indicates that the most dominant are Social Learning Theory (Akers, 1985; Bandura, 1973), Social Control Theory (also referred to as Social Bonding Theory; Hirschi, 1969), and Social Psychological Strain Theory (Agnew, 1992, 2005).

Social Learning Theory (SLT) maintains that children develop patterns of violent or delinquent behavior through imitation. These behaviors are observed by children to result in positive outcomes (e.g., control over others, or the acquisition of material or social benefits) (see Gershoff, 2002; Widom, 1998; Garland and Dougher, 1990; Walters and Grusec, 1977).

Social Control Theory (SCT) assumes that individuals have a natural tendency towards crime and violence which is restrained by their social bonds. 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-Psychological Strain Theory (SPST) focuses on maltreatment as a source of acute stress (Agnew 1992, 2005). Many studies examine the relationships between maltreatment and outcomes such as behavior problems, developmental delays, and changes in brain functioning (e.g. elevated cortisol levels) that may permanently alter the way that individuals respond to environmental stimuli (c.f. 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 post-traumatic 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.

There has been surprisingly little discussion of an economic approach to the relationship between maltreatment and crime. Studies of the economics of crime suggest that many individuals engage in crime because they do not have good market alternatives (c.f. Freeman, 1999). Hence, if maltreatment reduces human capital accumulation, or otherwise impairs an individual's ability to succeed in life, it may increase the risk that the individual engages in crime. Slade and Wissow (2005) use the Add Health data and models with family fixed effects to examine the effect of maltreatment reported in Wave III on some measures of academic functioning and a composite measure of delinquency that were obtained in Wave I, when children were still in the 6^{th} to 12^{th} grades. They find that maltreatment was related to higher absenteeism and more problems completing home work, but do not find any effect on delinquency.

We have re-examined these relationships and find even stronger evidence of poor academic functioning as of Wave I in children who later say that they were maltreated. These children have lower grade point averages, are more likely to have repeated grades, and are more likely to have been suspended or expelled from school. We also looked at wages as of Wave III and found little effect. However, in a sample this young it is difficult to interpret this finding as some of the worst-abused children may not be working, and others may be out of the labor market because they are in school. We conclude that it is plausible that an economic model of crime can explain our findings, but that we have no definitive proof.

b) *Prior Evidence about the Effects of Maltreatment on Crime and Related Behaviors*

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 adverse events, and current risky behaviors/outcomes. For example, Felitti (1998) and Dube et al. (2003a) show that adverse childhood experiences (ACEs) increase the 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 adult 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 ACE's *cause* risky behaviors, however. If, for example, poverty is associated with ACE's then the fact that people with ACE's have higher rates of criminal activity could actually reflect a causal relationship between poverty and involvement in crime. Moreover, many ACE studies aggregate maltreatment with other forms of household dysfunction rather than trying to separately identify the effect of maltreatment. Some studies that describe themselves as "longitudinal" also rely on an essentially cross sectional comparison between adults who say they were abused at some point before the study began, and other adults (c.f. Silverman et al. 1996).

A second group of studies 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) all use this design to examine the effects of child sexual abuse. The first two studies conclude that while some of the observed relationship

between maltreatment and negative outcomes is due to shared family background variables, maltreated twins in discordant pairs are more likely than their twins to suffer negative outcomes. However, Dinwiddie finds no differences between twins in discordant pairs.

Twin studies highlight the importance of controlling adequately for family background when attempting to identify the causal effects of maltreatment. But twin studies are likely to under-estimate the causal effects of abuse for two reasons. First, to the extent that there is random error in reports of abuse, estimates from twin models will be biased towards zero. (This is because twin comparisons rely on discordant reports, and reporting errors will create spurious differences). Second, the occurrence of abuse in a household may traumatize all children in the household. In addition, there may be few pairs of twins with discordant reports of maltreatment. We will also use a "twins design" as one of our methods, and will interpret any significant effects from these models as lower bounds on the effects of maltreatment.

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. (No direct measures of SES were available, so Widom matched children who attended similar schools). This study is unusual in that it distinguished between physical abuse, neglect, and sexual abuse, and also involved long-term follow up 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 that the limitations of relying on administrative data from an era in which mandatory reporting of child abuse did not exist. We believe that it is useful to try to replicate Widom's results using nationally representative data (hers were from a mid-western town) and alternative statistical methods.

Appendix Table 5 summarizes some well known studies. Most studies employ a similar methodology. A logistic regression is estimated on a crime variable, mostly official arrest records. The key covariates are the binary measures of child abuse, mostly sexual abuse and physical abuse. The endogeneity of abuse is either not addressed or it is dealt with by matching treatments to controls on the basis of a small set of observables. There is substantial variation in the estimated effects due to different designs, data sets, and sample compositions.

c) Gender Differences in Criminal Behavior

There are well-known gender differences in the propensities of males and females to engage in serious crime (Lanctot and LeBlanc, 2002) but there is little evidence about the ways that risk factors such as maltreatment differ between males and females. We also know little about whether socio-economic and family risk factors are more important for males or for females. Rivera and Widom (1990) examine the link between childhood abuse and neglect and later violent criminality. The authors find 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 and neglected females were at a greater risk of arrest for violence than control females whereas the relationship was barely significant for maltreated males. Rowe et al. (1995) examined siblings in 418 families

interviewed by telephone and concluded that males were more likely to engage in crime because they were exposed to more risk factors. In one of the most comprehensive studies investigating gender differences in risk factors for criminal behavior, Moffitt et al. (2001) followed 1,037 people from age three to age 21 in New Zealand. The researchers found little difference in the determinants of delinquency among males and females—both sexes were more likely to be delinquent if their mothers were critical and uncaring, if their mothers gave harsh and inconsistent discipline, or if they grew up in advantaged households.

d) Effects of SES on Maltreatment

Many studies have documented a relationship between poverty and child maltreatment which is hypothesized to work by increasing stress on both parents and children (c.f. Pelton, 1994 for a review, or Drake and Pandey, 1996 who find that neighborhood poverty is most strongly related to neglect). Paxson and Waldfogel (1999, 2002) find that higher rates of poverty and unemployment are linked to a higher incidence of child maltreatment and neglect, and that reductions in welfare benefits are also associated with large increases in substantiated instances of neglect. Similarly, Coulton et al. (1995) find that children in neighborhoods characterized by poverty, turnover, and high concentrations of female-headed families are at greater risk of maltreatment. Brown et al. (1998) report that maternal youth was one of the strongest predictors of subsequent maltreatment. However, these studies rely on aggregate Child Protective Services data on incidence, and poor parents may be both more likely to be accused of child maltreatment and less able to defend themselves against such charges. Thus, it is important to ask using individual-level data whether measures of socioeconomic status do actually increase the risk of child maltreatment, and mediate its effects.

In their review of the literature, Malinosky-Rummell and Hansen (1993) note that "The moderating effect of SES on long-term consequences has not yet been investigated" (page 76). In one of the few studies to directly address this issue using individual-level data, Trickett, et al. (1991) compared two groups of children with different backgrounds and found that in contrast to the assumption implicit in Malinosky-Rummell and Hansen's statement (that higher SES is always protective), the effects of abuse were generally worse in the higher SES group (perhaps because these children have more to loose).

3. Data

Add Health was specifically designed to investigate adolescents' health and risk behaviors.[2] It is considered the largest and most comprehensive survey of adolescents ever undertaken. A stratified sample of 80 high schools were 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 student contribution to the high school. Therefore, the school-based sample is

[2] The Add Health project is a program project designed by J. Richard Udry (PI) and Peter Bearman, and funded by grant P01-HD31921 from the National Institute of Child Health and Human Development to the Carolina Population Center, University of North Carolina at Chapel Hill, with cooperative funding participation by the National Cancer Institute; the National Institute of Alcohol Abuse and Alcoholism; the National Institute on Deafness and Other Communication Disorders; the National Institute on Drug Abuse; the National Institute of General Medical Sciences; the National Institute of Mental Health; the National Institute of Nursing Research; the Office of AIDS Research, NIH; the Office of Behavior and Social Science Research, NIH; the Office of the Director, NIH; the Office of Research on Women's Health, NIH; the Office of Population Affairs, DHHS; the National Center for Health Statistics, Centers for Disease Control and Prevention, DHHS; the Office of Minority Health, Centers for Disease Control and Prevention, DHHS; the Office of Minority Health, Office of Public Health and Science, DHHS; the Office of the Assistant Secretary for Planning and Evaluation, DHHS; and the National Science Foundation. Persons interested in obtaining data files from The National Longitudinal Study of Adolescent Health should contact Add Health Project, Carolina Population Center, 123 West Franklin Street, Chapel Hill, NC 27516-2524 (email: addhealth@unc.edu). More information on the design of Add Health can be found at http://www.cpc.unc.edu/projects/addhealth/design.

based on 80 pairs of schools.[3] An in-school questionnaire was administered to more than 90,000 students (virtually all students) in these sampled schools between 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 number of special over-samples were also selected for in-home interviews with varying probabilities using screeners from in-school questionnaires. These include the physically disabled, Black, ethnic, and genetic over-samples. A total of 20,745 adolescents were interviewed for Wave I. Interviews were also conducted with parents during Wave I. The adolescents are interviewed 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.

One of the over-samples that we utilize in this paper is the genetic over-sample. Based on the information provided in the in-school questionnaire, monozygotic (identical) twins, dizygotic (fraternal) twins, half-siblings were sampled with certainty.[4] There are a total of 289 monozygotic twins, 452 dizygotic twins, and 43 pairs of twins with unidentified zygosity in the Wave I Add Health sample. Sample sizes for our empirical analyses will be less than these

[3] Participating high schools were asked to identify junior high or middle schools that were expected to provide at least 5 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.

[4] The zygosity of the twin pairs was determined in a number of ways. First, all mixed sex twin pairs were classified as dizygotic. The majority of same-sex twins were determined to be monozygotic or dizygotic on the basis of self-reported confusability of their appearance (i.e. whether they looked like two peas in a pod as young children, and whether they were confused by strangers, teachers, of family members). A zygosity scale was created as an average of the reports by twins to the confusability items and a classification was made on the basis of a cut-off created by this scale. For cases where self-report appearance data was missing, the classification was made on the basis of the mother's responses to the confusability questions. Despite these efforts, some twins were classified as of uncertain zygosity status. The zygosity of these pairs was determined by DNA tests on the basis of molecular genetic markers. In some cases, there was a conflict between the twin's reports of zygosity and the classification based on confusability of appearance. These twins were classified as of uncertain zygosity. In our analyses, we treated these pairs as dizygotic twins.

numbers, however, because some of these twins do not appear again in Wave III and there are missing data in key variables for at least one twin in some twin pairs.

For sensitive topics, such as delinquent behavior, adolescents listened to pre-recorded questions through earphones and entered their answers directly on laptops in order to maintain confidentiality and to minimize the potential for interviewer or parental influence. Also, 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 (2005) provide evidence that rates of many risky behaviors reported in the Add Health are consistent with those measured in other sources.

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 6th grade. Specifically, they were asked whether and how often:

1. Parents (or other adult care-givers) had left them home alone when an adult should have been with them.
2. Parents (or other adult care-givers) had not taken care of their basic needs, such as keeping them clean or providing food or clothing.
3. Parents (or other adult care-givers) slapped, hit, or kicked them.
4. Parents (or other adult care-givers) 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.
5. Social services investigated how they were taken care of or tried to take them out of their living situations.

Respondents were also asked whether they had ever lived in a foster home.

The wording of these questions reflects an emerging consensus about definitions of maltreatment as reflected, for example, in the government sources like the Administration for Children (ACF) and Families of the Department of Health and Human Services.[5]

One limitation of this suite of questions is that they do not allow us to judge the timing of maltreatment. A second limitation our study shares with most others is that it is based on adult retrospective reports of maltreatment. It is possible that people tend to forget past abuse as they grow older. We have investigated "forgetting" directly by asking whether the older people in the sample were less likely to report childhood abuse than those who were 18. We find no evidence that this is the case.

A potentially more serious 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 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 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; how often the twins talked to each other; and how often the twins fought with each other. As shown in Appendix Table 1, we found few significant correlations between

[5] For example, the definitions given at the ACF's National Clearinghouse on Child Abuse and Neglect Information web site (http://nccanch.acf.hhs.gov/admin/glossary.cfm) are very similar to the abuse questions asked in the Add Health.

differences in the twins' reports about maltreatment and differences in reports about these other variables. These findings provide some evidence against the hypothesis that one twin is just "more negative" than the other.

In the third wave of Add Health, respondents answered detailed questions about their relationships with their parents. Specifically, they answered questions on whether (1) they enjoyed spending time with parents, (2) parents were warm and loving toward them, (3) they felt close to their parents, and (4) they received money or any other significant payment from their parents within the past 12 months. We compared these measures to the reports of maltreatment as a way to both assess the internal validity of our data and to test the reliability of our maltreatment measures. For all four measures of closeness to parents, respondents who reported maltreatment also reported that they had more distant relationships with their parents for all of our maltreatment variables.

Table 1 shows the fraction of respondents reporting various forms of maltreatment. The incidence of reports of particular types of maltreatment varies widely. Almost 5% say that they were investigated by Child Protective Services (CPS) or lived in foster care, which may be indicative of the most severe, substantiated abuse. Roughly eleven percent of the sample report that their parents ever failed to meet their basic needs. Only 4.8% 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% of

women and 40% of men reported some form of maltreatment while 19% reported physical abuse, 18% reported neglect, and 5% reported sexual abuse.

Altogether more than half of the children report some form of "maltreatment". Since a definition of maltreatment that encompassed half of all children would seem unacceptable, we examined the distribution of reports and found that only 8.2% report that they were left alone when they should have been supervised more than 10 times, while 6.3% 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% 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.

Columns 2 and 3 of Table 1 show that there are significant gender differences in exposure to abuse in our sample. Except for sexual abuse, males are more likely to report maltreatment than females. The figures in Table 1 are consistent with previous studies that documented that males are more likely to report physical abuse than females, while sexual abuse during childhood is more commonly reported by females (MacMillan et al., 1997). It is also noteworthy that the fraction of twins who report abuse (shown in column 4) is similar to that reported in the full sample. Finally, column (5) 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 abuse in twin models.

b) Outcome Measures

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 non-drug 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 (e.g. 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 non-drug 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 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 abuse 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 that either of these outcomes ever happened.

c) Explanatory variables

Of course there may be many other factors that differ between children who were maltreated and those who were not. The Add Health 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 2). We see, for example, that children who were maltreated are more likely to have had 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 1, and more likely to have a mother who was a teenager at the time of her child's birth.. Overall, children in families that were poor at Wave I are much more likely to report maltreatment in Wave 3 though again, there are differences by type of maltreatment. Only 3.9% of non-maltreated children are in families with incomes less than half the poverty line, compared to 7% of the respondents who report that their parents ever failed to meet their basic needs, 5.1% who report physical abuse, and 8.5% of those who report sexual abuse. These figures provide some evidence that the incidence of maltreatment (and not just the incidence of verified reports

to CPS)) varies with SES. It will be important to control for observed differences between families in order to identify a causal effect of maltreatment.

The last two panels of Table 2 focus on factors that might differ between twins in an effort to get at the question of why one twin would be abused while the other was not. It is not uncommon for some children in a household to be maltreated while others are unharmed (New York Times, 2005a); the question is whether this has anything to do with pre-existing characteristics of the child, or whether it is a random choice of the parent?

Panel 3 shows that in the entire sample, parents are somewhat more likely to have reported that a child was "bad tempered" at Wave I if the child reported that he/she was maltreated at Wave III. However, there is little systematic relationship between whether the parent reported a learning problem and whether the respondent later reported maltreatment. Panel 4 focuses on twin pairs with reported differences in maltreatment, and shows that there are few systematic differences between these twins in birth weight, parental reports of bad temper, and gender. The most significant differences are that parents who are reported to have physically abused their children more than 10 times are more likely to have reported that the abused child was bad tempered (which may be more of a comment on the parent's temperament than the child's), and parents are less likely to have failed to meet the basic needs of male children. These results suggest that in cases where one twin is abused and another is not, the choice of which is which may be more or less random.

In a study that supports this conclusion, Jaffee et al. (2004) examine monozygotic twins and report four reasons why one twin was treated differently than the other: One twin had been ill (but there was no consistent pattern in whether the mother treated the sickly child better or worse than the other); mothers had folk beliefs that children had to have opposite personalities,

or that one had to be dominant; mothers identified one of the twins with themselves; and mothers identified one of the twins with a partner or ex-partner.

As discussed above, we will also ask whether the effects of maltreatment vary with SES. SES is multi-dimensional concept, with many potential measures. We have experimented with various measures based on income, maternal education, teen parenthood, welfare use, and single parenthood. In what follows, we use an indicator of "low SES" that is equal to one if two or more of the following conditions hold: Mother is a high school drop out, the family income is less than poverty, the mother was a teenager when the child was born, the father was not present at Wave I, the biological father was ever jailed as of Wave I, or the parents were on welfare at Wave I. Appendix Table 3 breaks out means of outcomes by SES and whether or not the child was maltreated. These means suggest that maltreated children are more likely to engage in crime, irrespective of SES. On the other hand, there are some types of crime that are more common (assault) or less common (drug use) even among low SES people who were never maltreated. A second panel of Appendix Table 3 breaks out children who experienced CPS or foster care intervention. The table shows that those who report both such involvement and past abuse have systematically worse outcomes than other children, which is consistent with the idea that these children experienced the worst maltreatment.

4. Methods

The sensitive nature of child maltreatment makes it difficult to use experimental designs or even prospective longitudinal studies of at risk subjects. It would be unthinkable to divide study children into a control group and a treatment group that was maltreated. And in prospective studies, the researcher is morally and legally obligated to intervene if any cases of

maltreatment are detected. We will use retrospective reports and non-experimental data and attempt to compensate statistically for the problems involved in using these data. It is important to note that the crudeness of our measures is counter-balanced to some extent by the large sample size. That is, use of a "noisy measure" will make it harder to detect effects, but it is easier to detect even small effects in larger samples. We will begin with OLS models of the effects of different abuse measures on the criminal activity and victimization outcomes. These models will be of the form:

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

where Outcome is one of the crime involvement measures, maltreatment is one of the measures of maltreatment, X is a vector of individual and family control variables (See the notes to Table 3 for a complete list), State is a vector of state fixed effects that control for things like state institutions that deal with maltreatment and persistent differences in income between states, and ε is an error term. By comparing models with and without the vector X, we will be able to see the extent to which correlations between maltreatment and criminal outcomes are affected by the inclusion of detailed controls for observable characteristics.

As discussed above, we expect OLS models to yield over-estimates of the effects of maltreatment if some people are both systematically more likely to report bad outcomes, and more likely to report maltreatment. Omitted variables that are correlated both with maltreatment and with bad outcomes could also yield upward biased estimates (though the rich detail in the Add Health data set will help to minimize this possibility).

In an effort to deal with omitted variables biases and to test the robustness of our results, we also estimate models using propensity matching methods, first introduced by Rosenbaum and

Rubin (1983).[6] Matching methods attempt to make efficient use of the observable data, but may still be biased if the "selection only on observables" assumption is not satisfied. Hence, we next turn to models estimated using twins. In order to implement this design, we restrict our sample to twin pairs, and estimate models of the form:

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

where now X' is a much smaller vector of control variables that vary within twin pairs (gender and birth weight) and PairID is a unique identifier for each twin pair. These models control for all of the common elements of family background that are shared by the twins.

Although all of the twins share the same family backgrounds, only mono-zygotic or identical twins are considered to be genetically identical since they result from the splitting of a single fertilized egg. Since Add Health provides information on the zygosity of twins, we also

[6] In matching, each control unit is matched to a fixed number of units with the opposite treatment under the assumption of "unconfoundedness", i.e. the assumption that the treatment is random conditional on some set of observed characteristics. The average treatment effect is then calculated as the average within-match differences in the outcome variable between the treated and the untreated units. Unlike regression techniques, matching estimators do not impose any functional form restrictions nor do they assume a homogenous treatment effect across populations (Zhao, 2004). The propensity score method avoids the difficulty of adjusting for a multidimensional set of covariates by matching only on the univariate propensity score as shown by Rosenbaum and Rubin (1983). The propensity score is just an index of a unit's probability of being treated, conditional on observable characteristics (usually calculated using a model predicting the probability of treatment). Intervals of sample units with similar propensity scores are determined and within each interval, one must ensure that the balancing property is satisfied, i.e., the means of each characteristic do not differ between the treated and control units. Once the propensity score is estimated and the balancing property is satisfied, the average treatment effect on the treated can be calculated (Leuven and Sianesi, 2003; Becker and Ichino, 2002). Following Dehejia and Wahba (2002), we use a range of simple estimators including matching without replacement, single nearest neighbor matching with replacement, and radius matching with replacement. For matching without replacement, we consider low-to-high and high-to-low matching where the treatment units are ranked from lowest to highest or vice versa before the matching is performed. For radius matching, we consider a range of calipers. For each method, in addition to using a weighted difference in means, we estimate a regression weighted by the number of times a control unit is matched to a treatment unit (Dehejia and Wahba, 2002). See also the symposium on matching estimators in the February 2004 issue of the *Review of Economics and Statistics*.

estimate our models limiting the sample only to identical twins. These models obviously control for many of the factors common to both twins, in order to focus on the effects of maltreatment.

To assess the extent to which the relationship between maltreatment and outcomes differ by gender and by SES we will also estimate (2) with an interaction term between maltreatment and gender, and with an interaction between maltreatment and SES.

Finally, we present a set of estimates interacting maltreatment with an indicator equal to one if the children report CPS involvement or foster care, and a second set of estimates focusing on multiple types of abuse. These models can be viewed as a specification check which we use to confirm that the effects of maltreatment increase with the severity of the maltreatment.

Sample weights are available to correct for design effects and unequal probability of selection. Estimating the OLS models using the sample weights did not change the results. This is not surprising given the large set of covariates included in the regressions. Since Add Health is a school based survey, we have also estimated OLS models clustering the standard errors by school and using the sample weights, and again this did not change the results in any way.[7]

5. Results

Our main results for the "any abuse" variable defined using the "greater than 10 times" cutoffs for being left alone and for physical abuse are shown in Table 3. The first column shows an OLS model that includes a limited set of controls for child age, gender, race, ethnicity, and whether the child was born in the U.S. The second column shows models estimated with our full list of controls. It is remarkable that the inclusion of many of these controls has very little effect on the estimated "abuse" coefficients in the OLS models. All are statistically significant and

[7] There are 875 individuals with a missing sample weight and 265 individuals with no school identifier. These observations are dropped from the sample in models where sample weights are used and standard errors are clustered.

large relative to the means for "never maltreated" children shown in Table 2. For example, the probability of being involved in any non-drug related crime approximately doubles. The next two columns show the propensity score matching estimates using matching without replacement and single nearest neighbor matching.[8] Again, these estimates are remarkably consistent with those obtained from the simplest OLS model.

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 the "Any maltreatment" models in Appendix Table 4. The results with models for other abuse types are very similar and are available from the authors. This table shows, for example that having a father who had been 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 non-drug crime falls by about 7 percentage points between age 25 and age 18. Being white is associated with lower probabilities of committing non-drug type of crimes but with higher probabilities of using hard drugs. This pattern is reversed for blacks. Having been born outside the U.S. is associated with lower propensities of committing crime.

Most of the other variables controlling for family background are estimated with little precision. However, there is some evidence that children with a biological or stepfather present

[8] The propensity score is estimated using a logit model on the full list of controls and several interaction terms in order to satisfy the balancing property. We present results for matching without replacement using low-to-high ordering of the treatment units based on the propensity score and single nearest neighbor matching with replacement. Models from matching without replacement with high-to-low ordering of the propensity score and radius matching with calipers of 0.00005 and 0.00001 produced almost identical results. Results from these methods and the logit that estimates the propensity score are available from the authors.

at Wave I are less likely to engage in crime compared to those with no father present. Mother's education is usually associated with lower criminal propensities except for drug crimes: Individuals whose mothers have at least some college degree are more likely to use hard drugs. These findings suggest that those with higher incomes are more likely to use drugs, other things being equal.

Column 5 shows model (2) estimated using the sample of twins. The estimated coefficients on abuse are somewhat higher in this subsample than in the OLS models, though they are generally within one standard error. Column 6 shows models with twin fixed effects. These estimates are somewhat smaller than those in column 5, as one would expect. However, they still show evidence of large and statistically significant effects of maltreatment on most indicators of criminal activity. For example, individuals who were subject to any type of abuse are 14 percentage points more likely to commit some type of non-drug offense. They are also significantly more likely to commit burglary (by 4.4 percentage points), assault (by 6.4 percentage points), theft (by 4 percentage points), damage property (by 9.4 percentage points), and use drugs (by 8.6 percentage points). Maltreatment not only increases the probability that an individual will engage in crime but also increases the probability that he will be a victim of a crime (by 7.9 percentage points) as well.

Finally, the last column of the Table shows estimates using only the monozygotic twins. We have only 178 pairs of MZ twins with no missing data on both twins on abuse measures, and relatively few with differential maltreatment. For example, among these 178 twin pairs, the number of pairs with discordant reports is only 10 for physical abuse (>10 times); 18 for sexual abuse; 21 for neglect (>10 times); 25 for failing to meet basic needs; and 44 for any abuse (using the >10 times definitions). Therefore, it is remarkable that we still estimate significant effects of

maltreatment on many types of crime even in these models. In particular, estimates for burglary and use of hard drugs (both relatively frequent crimes) are robust to this change of samples. The point estimate for "crime victim" is also quite stable, though it is not statistically significant (p=0.20) given the larger standard errors in the MZ models.

Table 4 explores the effect of different types of maltreatment on outcomes, using the twin fixed effects models. 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 ones basic needs greatly increases the probability of committing a crime. Similarly, having 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 33 percentage points more likely to have committed any non-drug offense. Curiously, there is no significant effect on drug offenses. A comparison of the first two lines of Table 4 offers some support for our emphasis on a measure of "any abuse" 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.

Table 5 examines interactions between gender and maltreatment in the context of the twin fixed effects models. This table and those following leave out the "ever having been struck, etc." and "ever having been left alone" measures to save space. The main effects confirm that males are more likely to commit crime. The most consistent interactive effects are for sexual abuse, which seems to have very large effects on males. The propensities to commit armed robbery, burglary, assault, and grand theft are increased by 25, 19, 41, and 25 percentage

points respectively among males who were subjected to sexual abuse. There is also a large effect of most types of maltreatment on the probability of being convicted among males.

Table 6 presents interactions between SES and maltreatment. Many interactions are positive and statistically significant, indicating that maltreatment is more likely to cause crime in low-SES individuals. Low SES people are also more likely to have been convicted if they suffered any maltreatment and if they were neglected. There is one strongly significant negative interaction in the table, in the models of the effects of physical abuse on the propensity to damage property. This interaction offsets the positive main effect, suggesting that only higher SES children subjected to physical abuse more than 10 times are more likely to damage property. Note that this interaction is not significant in models where the maltreatment variable is whether the child was ever physically abused, but the main effect is also much smaller in this model.

If we are measuring an effect of maltreatment, then one might expect the effects to be worse if the maltreatment is more serious. Table 7 shows estimates of models that interact maltreatment with whether or not the respondent reported CPS involvement or foster care. Under the maintained hypothesis that CPS and foster care are involved in the most severe cases, this table asks whether the effects of child maltreatment are worse when the maltreatment is more serious. The evidence in Table 7 is consistent with the common sense hypothesis that it is.

Another index of the severity of abuse 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 than among those who were not neglected. The distribution of joint experiences of maltreatment is as follows: 77.3 percent of our sample report no maltreatment (using > 10 times cut-offs 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 twin fixed effects. Since there is no one in our twin sample who reported all four types of maltreatment, there are two dummy variables in the models representing "only one type of maltreatment" and "two or three types of maltreatment". We combined the indicators for two and three types of maltreatment into one category since the fractions of twin sample reporting two and three types of maltreatment are 5.6 percent and 0.9 percent, respectively.[9] The omitted category is "no maltreatment". The results presented in Table 8 provide evidence suggesting that the probability of crime increases with if a person suffers multiple forms of maltreatment. For every outcome, the magnitude of the effect is larger if the person suffered two or more types of maltreatment than if only one type of maltreatment occurred.

6. 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

[9] The fractions of the twin sample reporting no maltreatment and only one type of maltreatment are 79 percent and 17 percent, respectively.

maltreatment roughly doubles the probability that an individual engages in many types of crime. It is useful to put this result in perspective by comparing it to other estimates of the effects of factors related to crime. For example, using time series data from New York, Corman and Mocan (2005) find that a 1 percentage point decline in unemployment generates only a 2.2 percentage point decline in burglaries. They also find that a 10 percent increase in minimum wage leads to about 3.5 percent decrease in robberies in New York City.

An important predictor of whether or not a child will become a criminal is whether the father of that child is criminal also (Raine, 1993; Reis and Roth, 1993; Wilson and Herrnstein, 1985). Jacob and Lefgren (2003) find that the level of violent crime increases by 28 percent on days when school is in session and property crime decreases by 14 percent on such days. Although controversial, some studies have also shown an association between mental health disorders and criminal behavior. For example, in a sample drawn from a Danish birth cohort, the risk of offending is found to be 4.6 times higher for individuals with schizophrenia, and 2 times higher for those with an affective psychoses as compared to subjects never admitted to a psychiatric ward (Hodgins et al. 1996).

Grogger and Willis (2000) find that the introduction of crack cocaine in metropolitan areas was responsible for a 20 percent increase in murder rates, a fifteen percent increase in rapes, and a 27 percent increase in aggravated assault. Using individual-level data from the first two waves of Add Health, Mocan and Tekin (2006) find that having access to a gun at home increases the propensity to commit a variety of crimes by about 30 percent among adolescents. Duggan (2001) calculates that the decreases in gun ownership over the 1990s can explain up to a third of the decline in crime over the same period. Finally, Bingenheimer et al. (2005) find that

exposure to firearm violence approximately doubles the probability that an adolescent will engage in serious violence over the subsequent 2 years using propensity score matching methods.

This brief review suggests that the effects of abuse are large relative to those of many other risk factors for 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 as both as juveniles and as adults. Starting to engage in criminal behavior early may appreciate illegal human capital by raising experience in criminal activities, and depreciate capital in legal activities such as schooling or labor market. This would further increase criminal propensities. We looked at this possibility by estimating models of the effects of maltreatment on the likelihood of having been convicted in a juvenile court. OLS estimates were large and statistically significant. However, estimates from twin fixed effects models were estimated with much less precision though they were qualitatively similar.

Table 9 considers a crude translation of the effects measured in this paper into dollar terms, using estimates of the costs of some of the crimes we examine that are taken from the literature. The results of this exercise are very 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 costs of incarceration. Their estimates do not take account of other costs, such as the costs to society 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 these surveys. It should be noted that 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 abuse costs society about $6.7 billion per year. The Cohen estimates suggest a much larger figure of $62.5 billion. It is 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 in infancy show that they can reduce the incidence of substantiated cases of maltreatment by 50 percent (Olds et al., 1999). At a cost of about $4,000 per child, the total cost of providing this service to all children would be about $16 billion. Given that the crime induced by abuse is only one of the social costs of maltreatment, these estimates suggest that a home visiting program like Olds' might well pay for itself in terms of reducing social costs, 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 other people money) then the cost-benefit analysis begins to look even more favorable.

In summary, our study provides evidence that the apparent negative effects of maltreatment on children's propensity to engage in crime are real and not simply artifacts of other features of dysfunctional families. We find that being maltreated approximately doubles the probability of engaging in many types of crime and that the effects are worst for children from low SES backgrounds. Perhaps unsurprisingly, boys are at greater risk for increases in criminal propensities than girls. 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. Finally,

the probability of engaging in crime increases with the experience of multiple forms of maltreatment as well as the experience of CPS. These findings suggest that criminal behavior increases not only with the incidence of maltreatment but also with the severity of maltreatment, as one might expect.

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Table 1: Fraction of Add Health Sample Reporting Maltreatment

Type of Maltreatment	All	Males	Females	Twin Sample	Fraction Twins with Diff. reports
Ever left alone	0.397	0.424	0.373	0.405	0.409
Left alone > 10 times	0.082	0.089	0.077	0.082	0.129
Ever basic needs unsatisfied	0.113	0.14	0.091	0.126	0.161
Ever hit, spanked, kicked etc.	0.292	0.311	0.275	0.279	0.33
Hit etc. > 10 times	0.063	0.067	0.06	0.05	0.078
Ever sexual abuse	0.048	0.045	0.051	0.057	0.101
Ever any abuse	0.526	0.55	0.506	0.518	0.412
Any abuse using > 10 times cutoffs for physical abuse and being left alone	0.231	0.256	0.209	0.241	0.272
Ever Child Protective Services or foster care	0.049	0.047	0.05	0.049	0.072
Number of observations	13,509	6,200	7,309	928	

Table 2: Definitions and Means of Outcomes and Explanatory Variables by Any Maltreatment, Type of Maltreatment, Involvement CPS

Variable Name	Definition	Full Sample	Never Any Maltreat-ment	Ever Left Alone	Left Alone> 10X	Ever Fail to Meet Needs	Ever Physical Abuse	Physical Abuse >10X	Ever Sexual Abuse	CPS or Foster
1. Outcomes										
Any Non-Drug	=1 if committed any of the non-drug crimes in the past 12 months, else =0	0.164	0.109	0.226	0.241	0.295	0.244	0.261	0.324	0.289
Armed Robbery	=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	0.057
Burglary	=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	0.045
Assault	=1 if pulled a knife on someone, shot someone, or badly hurt someone in the past 12 months, else =0	0.071	0.049	0.010	0.094	0.155	0.105	0.108	0.193	0.168
Damaged Property	=1 if deliberately damaged property that belonged to someone else in the past 12 months, =0 otherwise	0.087	0.052	0.122	0.132	0.141	0.135	0.156	0.158	0.137
Theft>$50	=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	0.062
Any Hard Drugs	=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	0.179
Victim	=1 if the respondent had a gun/knife pulled 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	0.106	0.077	0.140	0.139	0.227	0.152	0.149	0.263	0.226
Ever Convicted	=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	0.143
2. Selected Explanatory Variables										
Mother Ed<HS [a]	=1 if the mother has less than high school degree, =0 otherwise	0.142	0.137	0.145	0.144	0.189	0.154	0.157	0.188	0.192
Jailed father	=1 if the biological father was ever jailed, =0 otherwise	0.135	0.098	0.177	0.219	0.208	0.189	0.226	0.228	0.272

Welfare	=1 if parents were on welfare during Wave I, =0 otherwise	0.073	0.066	0.077	0.076	0.135	0.084	0.084	0.135	0.160
Sibling4+	=1 if four or more siblings, =0 otherwise	0.080	0.083	0.072	0.053	0.097	0.081	0.083	0.095	0.100
Income<50% of Poverty	=1 if parental income was less 50% of poverty line at Wave I, =0 otherwise	0.042	0.039	0.043	0.049	0.070	0.048	0.051	0.063	0.087
Biological Father Present	=1 if biological father was present at Wave I, =0 otherwise	0.587	0.623	0.541	0.465	0.472	0.554	0.554	0.412	0.321
Mother Age at birth≤19 [a]	Mother's age at respondent's birth was 19 or less, =0 otherwise	0.074	0.069	0.083	0.092	0.094	0.084	0.080	0.106	0.084
3. Means of child characteristics that may differ between twins										
Child Bad Tempered	=1 if the parent reported that respondent was bad tempered at Wave I, =0 otherwise	0.260	0.234	0.282	0.303	0.321	0.305	0.314	0.325	0.343
Child Learning Problems	=1 if the parent reported that respondent had learning problems at Wave I, =0 otherwise	0.096	0.092	0.104	0.085	0.140	0.092	0.079	0.129	0.146
Number of Observations		13,509	6,396	5,357	1,133	1,528	3,941	846	650	808
4. Differences in reports of abuse on differences in child characteristics, twin sample only										
Birth Weight			0.048	0.063	0.085	0.058	0.038	0.077	0.131	0.042
			[.085]	[.077]	[.127]	[.132]	[.091]	[.161]	[.171]	[.151]
Bad Temper			-0.042	-0.037	-0.019	-0.057	-0.105	0.222	-0.114	0.056
			[.044]	[.045]	[.088]	[.067]	[0.048]**	[.090]**	[.074]	[.097]
Male			-0.064	-0.044	0.092	-0.193	-0.09	-0.093	0.039	0
			[.035]*	[.034]	[.061]	[.056]***	[.038]**	[.080]	[.074]	[.078]

[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. Therefore, sum of dummies for these variables may not sum up to 1 in the Table. Sample sizes for the outcomes range from 13,452 in "Any Non-Drug Crime" to 13,502 in "Any Hard Drugs".

Standard errors are in brackets. A *, **, *** indicates significance at 90%, 95%, 99% respectively.

Table 3: Effects of Any Abuse on Criminal Activity

(Using >10X cutoff for physical maltreatment and being left alone, Outcomes = Involvement in Crime Last 12 Months and Ever Convicted)

	OLS Short List Controls	OLS Full Controls	Propensity Score Matching With Replacement Low to High	Propensity Score Matching Single Nearest Neighbor	Twins Sample Full Controls	Twin FE	Identical Twin FE
Any non-drug	0.112***	0.108***	0.109***	0.100***	0.167***	0.147***	0.062
	(0.008)	(0.008)	(0.010)	(0.012)	(0.030)	(0.044)	(0.074)
Armed Robbery	0.024***	0.023***	0.024***	0.025***	0.030**	0.006	0.070***
	(0.004)	(0.004)	(0.005)	(0.005)	(0.013)	(0.017)	(0.025)
Burglary	0.027***	0.026***	0.027***	0.026***	0.036**	0.044***	0.047*
	(0.004)	(0.004)	(0.004)	(0.005)	(0.014)	(0.014)	(0.026)
Damaged Property	0.060***	0.060***	0.063***	0.059***	0.094***	0.094***	0.023
	(0.007)	(0.007)	(0.008)	(0.008)	(0.025)	(0.035)	(0.056)
Assault	0.058***	0.053***	0.051***	0.048***	0.096***	0.064**	0.039
	(0.006)	(0.006)	(0.007)	(0.009)	(0.022)	(0.030)	(0.057)
Theft>$50	0.034***	0.033***	0.034***	0.031***	0.051***	0.040**	0.023
	(0.004)	(0.005)	(0.005)	(0.006)	(0.016)	(0.020)	(0.035)
Any Hard Drug	0.067***	0.065***	0.071***	0.068***	0.072**	0.086**	0.117**
	(0.007)	(0.007)	(0.009)	(0.010)	(0.026)	(0.034)	(0.045)
Crime Victim	0.081***	0.074***	0.078***	0.076***	0.103***	0.079**	0.071
	(0.007)	(0.007)	(0.009)	(0.009)	(0.026)	(0.037)	(0.059)
Ever Convicted	0.056***	0.047***	0.047***	0.049***	0.036*	0.012	0.055
	(0.006)	(0.006)	(0.007)	(0.007)	(0.021)	(0.030)	(0.050)

Notes: Standard errors in parentheses. A *, **, *** indicates significance at 90%, 95%, 99% respectively.
"Short list" includes: child age, gender, race, ethnicity, and child U.S. born.
"Full controls" also include: child birth weight (<1500, 1500-2500, >2500 grams, missing); first born, first born missing; mom's education (<HS, HS, >HS, missing); Father ever jailed (or ever jailed missing); Parents' religion (Catholic, Baptist, Other Protestant, Other, None, Missing); Number of siblings (none, 1, 2, 3, 4, missing); Father present (biological, step, or missing); Family on AFDC in wave 1 (or missing); Poverty status (<=5, .5-1, 1-2x, >2x, missing); Mother's age at birth (<=19, 20-30, 31-40, 41+, missing); State fixed effects.
Twin FE models include child gender and indicators for very low birth weight and low birth weight.
The regression adjustment for the matching estimators use the full list of controls specified above. Standard errors for these regressions are computed using a bootstrap with 499 replications.

Table 4: Effects of Different Types of Maltreatment on Outcomes - Twin FE Models

(Each cell of the table shows the coefficient on the maltreatment indicator from a different regression).

Any Non-Drug	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.								
0.147***	0.006	0.044***	0.094***	0.064**	0.040**	0.086**	0.079**	0.012
(0.044)	(0.017)	(0.014)	(0.035)	(0.030)	(0.020)	(0.034)	(0.037)	(0.030)
2. Ever any maltreatment								
0.069*	-0.006	0.020*	0.061**	0.033	0.014	0.100***	0.036	-0.002
(0.036)	(0.014)	(0.012)	(0.029)	(0.024)	(0.016)	(0.027)	(0.030)	(0.025)
3. Maltreatment=1 if Parents Ever Left Alone When Should Have Been Supervised								
0.003	-0.021	0.014	0.025	-0.007	0.006	0.046*	-0.008	0.006
(0.036)	(0.014)	(0.012)	(0.029)	(0.025)	(0.016)	(0.028)	(0.030)	(0.025)
4. Maltreatment=1 if Parents Left Alone When Should Have Been Supervised > 10 Times								
0.011	-0.065***	0.020	0.025	0.020	0.001	0.043	0.086	-0.004
(0.065)	(0.025)	(0.021)	(0.051)	(0.044)	(0.029)	(0.049)	(0.053)	(0.044)
5. Maltreatment=1 if Parents Ever Failed to Meet Basic Needs								
0.151**	0.051**	0.047**	0.103**	0.081**	0.066**	0.087*	0.041	0.027
(0.058)	(0.022)	(0.019)	(0.046)	(0.039)	(0.026)	(0.045)	(0.048)	(0.040)
6. Maltreatment=1 if Parents Ever Struck etc.								
0.137***	0.025	0.024*	0.080**	0.073***	0.005	0.128***	0.106***	-0.005
(0.040)	(0.016)	(0.013)	(0.032)	(0.027)	(0.018)	(0.031)	(0.033)	(0.028)
7. Maltreatment=1 if Parents Struck etc. > 10 Times								
0.251***	0.026	0.052*	0.170***	0.045	0.027	0.182***	0.119*	0.043
(0.083)	(0.032)	(0.027)	(0.066)	(0.056)	(0.037)	(0.063)	(0.068)	(0.057)
8. Maltreatment=1 if Sexual Maltreatment								
0.328***	0.129***	0.106***	0.242***	0.142***	0.130***	0.038	0.109*	0.062
(0.072)	(0.028)	(0.023)	(0.057)	(0.049)	(0.032)	(0.056)	(0.060)	(0.050)

Notes: Standard errors in parentheses. A *, **, *** indicates significance at 90%, 95%, 99% respectively.

Table 5: Twin FE Models with Interaction Male and Maltreatment

	Any Non-Drug	Armed Robbery	Burglary	Damaged Property	Assault	Theft >$50	Any Hard Drug	Victim	Ever Convicted
1. Abuse=1 if Any Maltreatment Using > 10 Cutoffs for Physical Abuse and Being Left Alone									
Abuse	0.098	-0.007	0.022	0.119**	-0.024	0.011	0.020	0.039	-0.075*
	(0.062)	(0.024)	(0.020)	(0.049)	(0.042)	(0.028)	(0.047)	(0.051)	(0.042)
Abuse*	0.094	0.026	0.043	-0.048	0.167***	0.053	0.126**	0.078	0.164***
Male	(0.082)	(0.032)	(0.026)	(0.065)	(0.055)	(0.037)	(0.063)	(0.068)	(0.056)
Male	0.124**	0.009	0.020	0.137***	0.006	-0.006	0.050	0.076*	0.083**
	(0.053)	(0.021)	(0.017)	(0.042)	(0.036)	(0.024)	(0.040)	(0.044)	(0.036)
2. Abuse=1 if Ever Any Maltreatment									
Abuse	0.009	-0.001	0.003	0.029	-0.033	0.020	0.053	0.023	-0.058*
	(0.052)	(0.020)	(0.017)	(0.041)	(0.035)	(0.023)	(0.039)	(0.042)	(0.035)
Abuse*	0.113	-0.010	0.032	0.059	0.125***	-0.010	0.086*	0.025	0.106**
Male	(0.069)	(0.027)	(0.022)	(0.054)	(0.046)	(0.031)	(0.052)	(0.057)	(0.047)
Male	0.101*	0.023	0.019	0.096**	-0.008	0.018	0.042	0.091*	0.077*
	(0.060)	(0.023)	(0.019)	(0.047)	(0.041)	(0.027)	(0.045)	(0.050)	(0.041)
3. Abuse=1 if Parents Left Alone When Should Have Been Supervised > 10 Times									
Abuse	-0.117	-0.069*	0.020	-0.016	-0.009	-0.038	-0.071	0.049	-0.167**
	(0.097)	(0.037)	(0.031)	(0.077)	(0.066)	(0.043)	(0.074)	(0.080)	(0.065)
Abuse*	0.230*	0.007	-0.000	0.074	0.051	0.070	0.204**	0.067	0.293***
Male	(0.130)	(0.050)	(0.042)	(0.103)	(0.088)	(0.058)	(0.099)	(0.106)	(0.087)
Male	0.149***	0.013	0.039**	0.128***	0.060*	0.008	0.081**	0.106***	0.107***
	(0.049)	(0.019)	(0.016)	(0.039)	(0.033)	(0.022)	(0.037)	(0.040)	(0.033)
4. Abuse=1 if Parents Ever Failed to Meet Basic Needs									
Abuse	0.054	0.016	0.020	0.104	-0.085	0.045	0.045	-0.009	-0.073
	(0.082)	(0.031)	(0.026)	(0.065)	(0.054)	(0.036)	(0.062)	(0.067)	(0.055)
Abuse*	0.176*	0.064	0.048	-0.001	0.301***	0.038	0.076	0.090	0.181**
Male	(0.104)	(0.040)	(0.033)	(0.082)	(0.069)	(0.046)	(0.079)	(0.086)	(0.070)
Male	0.116**	-0.001	0.023	0.118***	-0.001	-0.002	0.071*	0.086**	0.098***
	(0.051)	(0.020)	(0.016)	(0.040)	(0.034)	(0.023)	(0.039)	(0.042)	(0.035)
5. Abuse=1 if Parents Struck etc. > 10 Times									
Abuse	0.263**	0.005	0.015	0.192**	0.068	0.119**	0.084	0.131	0.038
	(0.122)	(0.047)	(0.039)	(0.096)	(0.083)	(0.054)	(0.092)	(0.100)	(0.083)
Abuse*	-0.023	0.038	0.067	-0.038	-0.042	-0.167**	0.177	-0.021	0.009
Male	(0.161)	(0.062)	(0.052)	(0.127)	(0.110)	(0.072)	(0.122)	(0.133)	(0.110)

Male	0.160***	0.014	0.032**	0.129***	0.064*	0.022	0.081**	0.104***	0.131***
	(0.048)	(0.019)	(0.015)	(0.038)	(0.033)	(0.021)	(0.036)	(0.040)	(0.033)
6. Abuse=1 if Sexual Abuse									
Abuse	0.237**	0.019	0.022	0.218***	-0.040	0.019	-0.011	0.062	-0.027
	(0.094)	(0.035)	(0.029)	(0.074)	(0.063)	(0.041)	(0.073)	(0.078)	(0.065)
Abuse*	0.205	0.248***	0.190***	0.054	0.412***	0.250***	0.110	0.106	0.200**
Male	(0.136)	(0.051)	(0.043)	(0.108)	(0.091)	(0.060)	(0.106)	(0.113)	(0.094)
Male	0.151***	-0.001	0.024	0.127***	0.033	-0.004	0.089**	0.099**	0.119***
	(0.048)	(0.018)	(0.015)	(0.038)	(0.032)	(0.021)	(0.037)	(0.040)	(0.033)

Notes: Standard errors in parentheses. A *, **, *** indicates significance at 90%, 95%, 99% respectively.

Table 6: Twin FE Models with Interaction SES and Maltreatment

	Any Non-Drug	Armed Robbery	Burglary	Damaged Property	Assault	Theft >$50	Any Hard Drug	Victim	Ever Convicted
1. Abuse=1 if Any Maltreatment Using > 10 Cutoffs for Physical Abuse and Being Left Alone									
Abuse	0.105**	-0.021	0.052***	0.081**	0.068*	0.014	0.069*	0.061	-0.030
	(0.052)	(0.020)	(0.017)	(0.041)	(0.035)	(0.023)	(0.040)	(0.043)	(0.035)
Abuse*	0.154*	0.097***	-0.024	0.047	-0.015	0.091**	0.061	0.067	0.149**
Low SES	(0.093)	(0.036)	(0.030)	(0.074)	(0.064)	(0.042)	(0.071)	(0.077)	(0.064)
2. Abuse=1 if Ever Any Maltreatment									
Abuse	0.021	-0.022	0.019	0.030	0.021	-0.002	0.087***	0.016	-0.030
	(0.039)	(0.015)	(0.013)	(0.031)	(0.027)	(0.018)	(0.030)	(0.032)	(0.027)
Abuse*	0.224***	0.071**	0.005	0.144**	0.059	0.074**	0.062	0.083	0.131***
Low SES	(0.074)	(0.029)	(0.024)	(0.058)	(0.050)	(0.033)	(0.056)	(0.061)	(0.050)
3. Abuse=1 if Parents Left Alone When Should Have Been Supervised > 10 Times									
Abuse	-0.009	-0.068**	0.026	0.029	0.045	-0.037	-0.026	0.073	-0.088*
	(0.075)	(0.029)	(0.024)	(0.059)	(0.051)	(0.033)	(0.057)	(0.062)	(0.051)
Abuse*	0.071	0.008	-0.020	-0.015	-0.089	0.136**	0.240**	0.047	0.294***
Low SES	(0.134)	(0.051)	(0.043)	(0.105)	(0.090)	(0.059)	(0.101)	(0.109)	(0.089)
4. Abuse=1 if Parents Ever Failed to Meet Basic Needs									
Abuse	0.040	0.018	0.034	0.007	0.046	0.038	0.056	0.010	-0.008
	(0.070)	(0.027)	(0.022)	(0.055)	(0.047)	(0.031)	(0.053)	(0.058)	(0.048)
Abuse*	0.345***	0.102**	0.040	0.299***	0.108	0.087	0.096	0.095	0.107
Low SES	(0.119)	(0.046)	(0.038)	(0.094)	(0.081)	(0.053)	(0.091)	(0.099)	(0.082)
5. Abuse=1 if Parents Struck etc. > 10 Times									
Abuse	0.325***	-0.003	0.085**	0.331***	0.121*	0.043	0.208**	0.151*	0.068
	(0.106)	(0.041)	(0.034)	(0.083)	(0.072)	(0.048)	(0.081)	(0.088)	(0.073)
Abuse*	-0.178	0.080	-0.085	-0.418***	-0.199*	-0.041	-0.058	-0.075	-0.063
Low SES	(0.174)	(0.067)	(0.056)	(0.137)	(0.118)	(0.078)	(0.133)	(0.144)	(0.119)
6. Abuse=1 if Sexual Abuse									
Abuse	0.280***	0.110***	0.106***	0.169**	0.137**	0.077*	-0.037	0.090	0.072
	(0.093)	(0.036)	(0.030)	(0.074)	(0.064)	(0.041)	(0.072)	(0.078)	(0.065)
Abuse*	0.118	0.048	0.000	0.178	0.013	0.131**	0.184	0.048	-0.026
Low SES	(0.146)	(0.056)	(0.047)	(0.115)	(0.100)	(0.065)	(0.113)	(0.122)	(0.101)

Notes: Standard errors in parentheses. A *, **, *** indicates significance at 90%, 95%, 99% respectively.

Table 7: Twin FE Models with Interaction Between Investigation by CPS or Foster and Maltreatment

	Any Non-Drug	Armed Robbery	Burglary	Damaged Property	Assault	Theft > $50	Any Hard Drug	Victim	Ever Convicted
1. Abuse=1 if Any Maltreatment Using > 10 Cutoffs for Physical Abuse and Being Left Alone									
Abuse	0.100**	-0.015	0.041***	0.077**	0.014	0.041*	0.081**	0.043	-0.015
	(0.047)	(0.018)	(0.015)	(0.038)	(0.032)	(0.021)	(0.036)	(0.039)	(0.032)
Abuse*CPS or Foster	0.291***	0.101**	-0.030	0.172**	0.165**	-0.027	0.127	0.137	0.222***
	(0.110)	(0.042)	(0.035)	(0.087)	(0.073)	(0.050)	(0.084)	(0.091)	(0.075)
2. Abuse=1 if Ever Any Maltreatment									
Abuse	0.039	-0.013	0.017	0.046	0.010	0.013	0.097***	0.019	-0.019
	(0.037)	(0.014)	(0.012)	(0.029)	(0.024)	(0.017)	(0.028)	(0.030)	(0.025)
Abuse*CPS or Foster	0.371***	0.085**	-0.007	0.287***	0.117*	-0.006	0.111	0.140*	0.271***
	(0.098)	(0.038)	(0.032)	(0.078)	(0.066)	(0.045)	(0.075)	(0.081)	(0.067)
3. Abuse=1 if Parents Left Alone When Should Have Been Supervised > 10 Times									
Abuse	-0.076	-0.060**	0.021	-0.059	0.020	-0.002	0.018	0.045	-0.023
	(0.070)	(0.027)	(0.022)	(0.055)	(0.048)	(0.031)	(0.054)	(0.058)	(0.048)
Abuse*CPS or Foster	0.517***	-0.089	-0.155**	0.498***	-0.151	-0.139	0.285*	0.120	0.181
	(0.197)	(0.076)	(0.063)	(0.155)	(0.134)	(0.088)	(0.151)	(0.162)	(0.135)
4. Abuse=1 if Parents Ever Failed to Meet Basic Needs									
Abuse	0.061	0.003	0.028	0.073	-0.013	0.064**	0.085	-0.048	-0.007
	(0.067)	(0.026)	(0.022)	(0.053)	(0.045)	(0.030)	(0.052)	(0.055)	(0.046)
Abuse*CPS or Foster	0.390***	0.164***	0.026	0.221**	0.224***	0.005	0.096	0.302***	0.144
	(0.128)	(0.049)	(0.041)	(0.102)	(0.086)	(0.057)	(0.098)	(0.105)	(0.088)
5. Abuse=1 if Parents Struck etc. > 10 Times									
Abuse	0.202**	0.034	0.066**	0.126*	0.058	0.036	0.177**	0.118	0.023
	(0.095)	(0.037)	(0.031)	(0.075)	(0.065)	(0.043)	(0.072)	(0.078)	(0.065)
Abuse*CPS or Foster	0.163	-0.025	-0.043	0.119	-0.035	-0.031	0.073	-0.076	0.109
	(0.175)	(0.068)	(0.056)	(0.139)	(0.119)	(0.079)	(0.133)	(0.145)	(0.120)
6. Abuse=1 if Sexual Abuse									
Abuse	0.260***	0.054	0.084***	0.274***	-0.038	0.118***	0.020	0.057	-0.065
	(0.092)	(0.035)	(0.029)	(0.073)	(0.061)	(0.041)	(0.071)	(0.077)	(0.063)
Abuse*CPS or Foster	0.243	0.257***	0.014	0.031	0.320***	0.101	0.070	0.209	0.433***
	(0.177)	(0.067)	(0.057)	(0.140)	(0.118)	(0.079)	(0.138)	(0.148)	(0.121)

Notes: Standard errors in parentheses. A *, **, *** indicates significance at 90%, 95%, 99% respectively.

Table 8: Twin FE Models with Multiple Experiences of Maltreatment

Variable	Any Non-Drug	Armed Robbery	Burglary	Damaged Property	Assault	Theft >$50	Other Hard Drug	Victim	Ever Convicted
Only One Maltreatment	0.082*	-0.027	0.023	0.031	0.021	0.002	0.079**	0.050	-0.007
	(0.048)	(0.018)	(0.015)	(0.038)	(0.032)	(0.021)	(0.037)	(0.040)	(0.033)
Two or More types of Maltreatment	0.296***	0.106***	0.105***	0.240***	0.152***	0.117***	0.097*	0.128**	0.068
	(0.071)	(0.027)	(0.023)	(0.056)	(0.048)	(0.032)	(0.055)	(0.059)	(0.049)

Notes: Standard errors in parentheses. A *, **, *** indicates significance at 90%, 95%, 99% respectively.

Table 9: Estimated Annual Costs of Maltreatment in Terms of Increases in Costs of Crime

a) Costs from Lochner and Moretti (2004)

Crime	Cost Per Crime	Prevalence in Add Health	Estimated Effect of Abuse - OLS	Annual Per Person Cost of Abuse	Total Cost of Abuse (millions)
Assault	9,917	0.071	0.064	$145.98	5,693
Robbery	9,385	0.020	0.006	12.95	505
Burglary	987	0.019	0.044	9.99	389.61
Theft>$50	198	0.033	0.040	1.82	100.1
				Sum:	**6,688**

b) Costs from Cohen (2004)

Crime	Cost Per Crime	Prevalence in Add Health	Estimated Effect of Abuse - OLS	Annual Per Person Cost of Abuse	Total Cost of Abuse (millions)
Assault	70,000	0.071	0.064	1030.40	40,186
Robbery	232,000	0.020	0.006	320.16	12,486
Burglary	25,000	0.019	0.044	253.00	9,867
				Sum:	**62,539**

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 3, column 6. Annual per person costs are obtained by multiplying the cost by the estimated effect, and then multiplying by the incidence of any abuse (.23). Total cost of abuse is estimated based on 39 million people aged 20-29 in 2000. Costs in Lochner and Moretti are in $1993, and in Cohen are in $2000.

Appendix Table 1: 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*	0.060	0.049	0.078	0.051	0.049	0.105	-0.030
	(0.062)	(0.065)	(0.038)	(0.067)	(0.056)	(0.035)	(0.071)	(0.043)
2. Differences in reports about how often twins fight with each other								
Difference	0.037	0.022	0.001	0.035	-0.022	0.020	0.055*	-0.012
	(0.036)	(0.034)	(0.024)	(0.038)	(0.024)	(0.018)	(0.032)	(0.019)
3. Differences in reports about how far they must travel to see each other								
Difference	0.027	0.050	0.007	0.034	-0.032	0.013	0.013	0.007
	(0.056)	(0.050)	(0.036)	(0.058)	(0.033)	(0.027)	(0.048)	(0.029)
Differences in reports about how often they talk to each other								
Difference	-0.033	-0.031	0.028	-0.014	-0.068*	0.006	-0.040	-0.009
	(0.055)	(0.050)	(0.037)	(0.059)	(0.037)	(0.025)	(0.047)	(0.022)
5. Differences in reports about how often they see each other								
Difference	-0.110*	-0.147***	-0.092**	-0.060	-0.056	-0.019	-0.045	-0.048
	(0.066)	(0.055)	(0.038)	(0.070)	(0.044)	(0.033)	(0.057)	(0.032)

Notes: Standard errors in parentheses. A *, **, *** indicates significance at 90%, 95%, 99% respectively.

Appendix Table 2: Definitions and Means of All Explanatory Variables Included in Regressions by Any Maltreatment, Type of Maltreatment, Involvement CPS

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	CPS or Foster
Age18 [a]	=1 if 18 years old, =0 otherwise	0.010	0.009	0.012	0.017	0.010	0.011	0.015	0.008	0.011
Age19	=1 if 19 years old, =0 otherwise	0.095	0.090	0.104	0.093	0.093	0.091	0.070	0.114	0.099
Age20	=1 if 20 years old, =0 otherwise	0.132	0.123	0.145	0.152	0.156	0.134	0.143	0.126	0.144
Age21	=1 if 21 years old, =0 otherwise	0.160	0.159	0.163	0.158	0.168	0.151	0.124	0.151	0.149
Age22	=1 if 22 years old, =0 otherwise	0.190	0.186	0.189	0.166	0.182	0.201	0.197	0.182	0.213
Age23	=1 if 23 years old, =0 otherwise	0.192	0.198	0.187	0.208	0.179	0.191	0.195	0.197	0.191
Age24	=1 if 24 years old, =0 otherwise	0.160	0.170	0.145	0.150	0.141	0.160	0.194	0.152	0.140
Age25	=1 if 25 years old, =0 otherwise	0.152	0.055	0.048	0.050	0.058	0.054	0.051	0.060	0.048
Age26+	=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	0.006
Male	=1 if male, =0 otherwise	0.459	0.436	0.491	0.495	0.567	0.489	0.482	0.432	0.433
White	=1 if white, =0 otherwise	0.656	0.670	0.642	0.642	0.559	0.635	0.610	0.575	0.609
Black	=1 if Black, =0 otherwise	0.222	0.229	0.220	0.201	0.282	0.211	0.217	0.274	0.272
Other race [a]	=1 if other race, =0 otherwise	0.105	0.085	0.120	0.135	0.141	0.133	0.147	0.115	0.105
Hispanic	=1 if Hispanic, =0 otherwise	0.159	0.146	0.170	0.150	0.201	0.189	0.176	0.203	0.141
USborn	=1 if born in the U.S., =0 otherwise	0.922	0.931	0.912	0.908	0.904	0.906	0.904	0.922	0.952
Mother Ed<HS [a]	=1 if the mother has less than high school degree, =0 otherwise	0.142	0.137	0.145	0.144	0.189	0.154	0.157	0.188	0.192
Mother Ed=HS	=1 if the mother has high school degree, =0 otherwise	0.316	0.318	0.317	0.288	0.320	0.304	0.261	0.288	0.318
Mother Ed>HS	=1 if the mother has more than high school degree, =0 otherwise	0.443	0.453	0.428	0.442	0.338	0.430	0.442	0.368	0.324
Jailed father	=1 if the biological father was ever jailed, =0 otherwise	0.135	0.098	0.177	0.219	0.208	0.189	0.226	0.228	0.272
Catholic	=1 if parents are Catholic, =0 otherwise	0.247	0.235	0.254	0.244	0.236	0.267	0.223	0.238	0.202
Baptist	=1 if parents are Baptist, =0 otherwise	0.204	0.220	0.192	0.173	0.238	0.177	0.177	0.240	0.217
Other Protestant	=1 if parents are other Protestant, =0 otherwise	0.210	0.219	0.203	0.211	0.166	0.195	0.191	0.148	0.207
Other Religion	=1 if parents are other religion, =0 otherwise	0.145	0.142	0.145	0.155	0.131	0.155	0.183	0.145	0.150
No Religion [a]	=1 if parents believe in no religion, =0 otherwise	0.054	0.048	0.060	0.068	0.062	0.060	0.058	0.069	0.069

First Child	=1 if the person is the first child, =0 otherwise	0.489	0.470	0.510	0.556	0.490	0.522	0.559	0.520	0.533
Welfare	=1 if parents were on welfare during Wave I, =0 otherwise	0.073	0.066	0.077	0.076	0.135	0.084	0.084	0.135	0.160
Very Low BW	=1 if birth weight was less than 1500 grams, =0 otherwise	0.018	0.020	0.016	0.015	0.018	0.015	0.018	0.020	0.020
Low BW	=1 if birth weight was between 1500 and 2500 grams, =0 otherwise	0.072	0.070	0.077	0.067	0.071	0.071	0.076	0.091	0.090
Normal BW [a]	=1 if birth weight is greater than 2500 grams, =0 otherwise	0.730	0.743	0.714	0.711	0.676	0.722	0.700	0.680	0.600
Sibling0 [a]	=1 if no siblings, =0 otherwise	0.193	0.183	0.210	0.265	0.217	0.202	0.229	0.212	0.267
Sibling1	=1 if one sibling, =0 otherwise	0.353	0.357	0.346	0.361	0.317	0.352	0.323	0.337	0.286
Sibling2	=1 if two siblings, =0 otherwise	0.244	0.240	0.246	0.221	0.238	0.241	0.233	0.228	0.189
Sibling3	=1 if three sibling, =0 otherwise	0.114	0.119	0.111	0.091	0.121	0.111	0.124	0.112	0.097
Sibling4+	=1 if four or more siblings, =0 otherwise	0.080	0.083	0.072	0.053	0.097	0.081	0.083	0.095	0.100
Income<50%	=1 if parental income was less 50% of poverty line at Wave I, =0 otherwise	0.042	0.039	0.043	0.049	0.070	0.048	0.051	0.063	0.087
Income50-100%	=1 if parental income was between 50% and 100% of poverty line at Wave I, =0 otherwise	0.062	0.061	0.064	0.063	0.092	0.065	0.067	0.105	0.111
Income100-200%	=1 if parental income was between 100% and 200% of poverty line at Wave I, =0 otherwise	0.139	0.130	0.153	0.145	0.178	0.153	0.154	0.192	0.276
Income200% [a]	=1 if parental income was greater than 200% of poverty line at Wave I, =0 otherwise	0.757	0.770	0.740	0.744	0.660	0.734	0.728	0.640	0.626
Biological Father	=1 if biological father was present at Wave I, =0 otherwise	0.587	0.623	0.541	0.465	0.472	0.554	0.554	0.412	0.321
Step Father	=1 if step father was present at Wave I, =0 otherwise	0.108	0.097	0.120	0.142	0.102	0.121	0.124	0.145	0.239
No Father [a]	=1 if no father was present at Wave I, =0 otherwise	0.302	0.277	0.336	0.392	0.422	0.322	0.317	0.435	0.432
Mother Age at birth≤19 [a]	Mother's age at respondent's birth was 19 or less, =0 otherwise	0.074	0.069	0.083	0.092	0.094	0.084	0.080	0.106	0.084
Mother Age at birth20-30	Mother's age at respondent's birth was between 20 and 30, =0	0.519	0.529	0.506	0.488	0.467	0.507	0.492	0.471	0.350

	otherwise									
Mother Age at birth31-40	Mother's age at respondent's birth was between 31-40, =0 otherwise	0.133	0.146	0.120	0.102	0.086	0.114	0.099	0.095	0.061
Mother Age at birth40+	Mother's age at respondent's birth was greater than 40, =0 otherwise	0.007	0.007	0.006	0.004	0.007	0.007	0.009	0.009	0.005

[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. Therefore, the sum of dummies for these variables may not sum up to 1 in the Table.

Appendix Table 3: Criminal Activity by SES and CPS/Foster Care Intervention

	Low SES			High SES		
	Never Abuse	Ever Abuse	Abuse using Higher Cutoffs	Never Abuse	Ever Abuse	Abuse using Higher Cutoffs
Ever convicted	0.046	0.106	0.126	0.038	0.069	0.097
Damaged property	0.039	0.116	0.138	0.055	0.118	0.136
Assault	0.071	0.127	0.150	0.042	0.078	0.107
Robbery	0.015	0.039	0.054	0.010	0.024	0.034
Burglary	0.011	0.032	0.043	0.009	0.026	0.040
Theft>$50	0.018	0.051	0.065	0.017	0.046	0.060
Used Other Drug	0.062	0.125	0.093	0.092	0.161	0.138
Crime Victim	0.098	0.185	0.215	0.071	0.113	0.157
Any Non-drug	0.121	0.240	0.279	0.105	0.204	0.251
# Observations	1,361	1,880	1,006	5,030	5,220	2,105

	CPS or Foster Care			No CPS or Foster Care		
	Never Abuse	Ever Abuse	Abuse using Higher Cutoffs	Never Abuse	Ever Abuse	Abuse using Higher Cutoffs
Ever convicted	0.056	0.163	0.160	0.040	0.069	0.095
Damaged property	0.075	0.151	0.159	0.052	0.114	0.132
Assault	0.179	0.163	0.169	0.041	0.075	0.100
Robbery	0.013	0.067	0.071	0.011	0.023	0.032
Burglary	0.013	0.053	0.055	0.009	0.023	0.035
Theft>$50	0.031	0.069	0.076	0.017	0.044	0.057
Used Other Drug	0.130	0.192	0.204	0.086	0.148	0.164
Crime Victim	0.247	0.163	0.227	0.069	0.115	0.152
Any Non-drug	0.255	0.294	0.301	0.101	0.199	0.242
# Observations	162	646	494	5,898	6,065	2,421

Appendix Table 4: Full OLS Results for Models Corresponding to Column 2 of Table 3.

Variable	Any Non-Drug	Armed Robbery	Burglary	Damaged Property	Attacked Someone	Theft > $50	Other Hard Drug	Victim	Ever Convicted
Any Abuse	0.108***	0.023***	0.026***	0.060***	0.053***	0.033***	0.065***	0.074***	0.047***
	(0.008)	(0.004)	(0.004)	(0.007)	(0.006)	(0.005)	(0.007)	(0.007)	(0.006)
Age19	0.050	0.008	-0.016	0.026	0.015	-0.025	-0.042	0.047*	0.013
	(0.034)	(0.013)	(0.018)	(0.028)	(0.024)	(0.022)	(0.034)	(0.026)	(0.019)
Age20	0.010	0.004	-0.015	-0.005	-0.010	-0.026	-0.040	0.012	0.013
	(0.034)	(0.013)	(0.018)	(0.028)	(0.024)	(0.022)	(0.033)	(0.025)	(0.018)
Age21	-0.006	0.004	-0.025	-0.023	0.005	-0.041*	-0.064*	0.021	0.011
	(0.033)	(0.013)	(0.017)	(0.028)	(0.024)	(0.022)	(0.033)	(0.025)	(0.018)
Age22	-0.021	-0.002	-0.027	-0.033	-0.010	-0.038*	-0.065**	0.014	0.018
	(0.033)	(0.013)	(0.017)	(0.027)	(0.024)	(0.022)	(0.033)	(0.025)	(0.018)
Age23	-0.039	-0.005	-0.027	-0.051*	-0.009	-0.049**	-0.071**	0.010	0.016
	(0.033)	(0.013)	(0.017)	(0.027)	(0.024)	(0.022)	(0.033)	(0.025)	(0.018)
Age24	-0.066**	-0.005	-0.033*	-0.060**	-0.025	-0.049**	-0.080**	-0.011	0.012
	(0.033)	(0.013)	(0.017)	(0.027)	(0.024)	(0.022)	(0.033)	(0.025)	(0.018)
Age25	-0.072**	-0.015	-0.042**	-0.071**	-0.023	-0.067***	-0.096***	-0.003	0.025
	(0.035)	(0.013)	(0.017)	(0.028)	(0.025)	(0.022)	(0.034)	(0.027)	(0.020)
Age26+	-0.068	-0.002	-0.039**	-0.083**	0.006	-0.056**	-0.109***	0.014	-0.006
	(0.046)	(0.019)	(0.019)	(0.033)	(0.037)	(0.026)	(0.039)	(0.041)	(0.027)
Male	0.156***	0.023***	0.020***	0.095***	0.080***	0.029***	0.055***	0.102***	0.088***
	(0.006)	(0.003)	(0.002)	(0.005)	(0.005)	(0.003)	(0.006)	(0.005)	(0.004)
White	-0.026**	0.001	-0.007	-0.008	-0.015*	-0.005	0.036***	-0.015	0.002
	(0.013)	(0.004)	(0.005)	(0.010)	(0.009)	(0.007)	(0.011)	(0.011)	(0.008)
Black	0.021	0.023***	0.009	-0.017	0.031***	0.009	-0.072***	0.036***	-0.009
	(0.015)	(0.006)	(0.006)	(0.011)	(0.011)	(0.008)	(0.011)	(0.013)	(0.009)
Hispanic	-0.001	0.004	0.000	-0.021***	0.016**	0.001	-0.017*	0.018*	-0.009
	(0.010)	(0.004)	(0.004)	(0.008)	(0.008)	(0.005)	(0.010)	(0.009)	(0.007)
Usborn	0.024*	0.007*	0.003	0.008	0.027***	-0.000	0.046***	0.048***	0.040***
	(0.013)	(0.004)	(0.004)	(0.009)	(0.009)	(0.007)	(0.010)	(0.010)	(0.006)
Mother Ed=HS	-0.012	0.002	0.002	-0.007	-0.006	-0.009*	0.013	-0.019**	-0.015**
	(0.010)	(0.004)	(0.004)	(0.008)	(0.008)	(0.005)	(0.008)	(0.009)	(0.007)
Mother Ed>HS	-0.005	0.004	0.000	0.007	-0.015*	-0.006	0.036***	-0.022**	-0.013*

	(0.010)	(0.004)	(0.004)	(0.008)	(0.008)	(0.005)	(0.009)	(0.009)	(0.007)
Jailed Father	0.038***	0.013***	0.007*	0.018**	0.028***	0.012**	0.034***	0.034***	0.052***
	(0.010)	(0.005)	(0.004)	(0.008)	(0.008)	(0.006)	(0.009)	(0.009)	(0.008)
Catholic	0.020*	0.001	0.002	0.011	0.007	0.003	-0.001	-0.005	0.004
	(0.011)	(0.004)	(0.004)	(0.009)	(0.007)	(0.006)	(0.010)	(0.009)	(0.007)
Baptist	0.004	-0.000	-0.008*	-0.014*	0.018**	-0.011**	-0.017*	0.015	0.009
	(0.011)	(0.004)	(0.004)	(0.008)	(0.008)	(0.005)	(0.009)	(0.010)	(0.007)
Other Protestant	0.017	0.001	0.000	-0.004	0.017**	-0.004	-0.003	0.007	0.011
	(0.011)	(0.004)	(0.004)	(0.008)	(0.007)	(0.006)	(0.010)	(0.009)	(0.007)
No Religion	0.019	-0.010*	-0.001	0.005	0.032***	-0.006	0.013	0.025*	0.021*
	(0.016)	(0.005)	(0.006)	(0.013)	(0.011)	(0.008)	(0.015)	(0.013)	(0.011)
First Child	0.003	-0.002	0.001	0.010*	0.000	0.001	-0.007	0.001	-0.003
	(0.008)	(0.003)	(0.003)	(0.006)	(0.005)	(0.004)	(0.007)	(0.006)	(0.005)
Very low BW	-0.022	-0.003	-0.006	0.007	-0.010	-0.028***	-0.025	0.003	0.011
	(0.023)	(0.009)	(0.008)	(0.018)	(0.017)	(0.006)	(0.018)	(0.021)	(0.017)
Low BW	-0.012	0.003	-0.002	-0.003	-0.000	-0.008	-0.008	-0.008	0.009
	(0.012)	(0.005)	(0.004)	(0.009)	(0.009)	(0.005)	(0.010)	(0.010)	(0.008)
Sibling1	-0.006	-0.004	0.002	0.001	0.001	0.000	-0.004	-0.005	-0.016**
	(0.010)	(0.004)	(0.004)	(0.008)	(0.007)	(0.005)	(0.009)	(0.008)	(0.007)
Sibling2	-0.000	-0.004	0.002	0.009	0.005	0.002	-0.015	0.004	-0.015*
	(0.012)	(0.005)	(0.004)	(0.009)	(0.008)	(0.006)	(0.010)	(0.010)	(0.008)
Sibling3	-0.001	-0.010*	0.002	0.005	0.012	-0.003	-0.020*	-0.006	-0.014
	(0.014)	(0.005)	(0.005)	(0.011)	(0.010)	(0.007)	(0.012)	(0.011)	(0.009)
Sibling4+	-0.001	-0.000	-0.000	0.001	0.013	0.005	-0.019	0.029**	-0.001
	(0.016)	(0.007)	(0.006)	(0.011)	(0.011)	(0.008)	(0.013)	(0.014)	(0.011)
Welfare	0.005	-0.002	-0.002	0.006	-0.004	0.007	-0.015	0.001	0.002
	(0.014)	(0.006)	(0.005)	(0.010)	(0.011)	(0.007)	(0.010)	(0.013)	(0.009)
Income<50%	0.015	0.001	-0.006	0.015	0.008	0.001	-0.018	0.007	0.009
	(0.021)	(0.009)	(0.009)	(0.015)	(0.016)	(0.010)	(0.015)	(0.019)	(0.014)
Income50-100%	-0.019	-0.005	-0.009	-0.013	-0.010	-0.008	-0.013	-0.020	-0.006
	(0.019)	(0.008)	(0.008)	(0.013)	(0.015)	(0.009)	(0.014)	(0.017)	(0.012)
Income100-200%	0.003	-0.006	-0.005	0.011	-0.010	0.005	0.006	-0.011	0.001
	(0.018)	(0.008)	(0.007)	(0.013)	(0.014)	(0.009)	(0.014)	(0.016)	(0.012)
Biological Father	-0.184***	-0.042	0.006	-0.035	-0.170***	-0.020	0.007	-0.161***	0.016
	(0.065)	(0.032)	(0.006)	(0.044)	(0.058)	(0.029)	(0.042)	(0.062)	(0.032)

Step Father	-0.186***	-0.045	0.007	-0.038	-0.162***	-0.013	0.042	-0.138**	0.026
	(0.065)	(0.033)	(0.007)	(0.045)	(0.058)	(0.029)	(0.043)	(0.062)	(0.032)
Mother Age at birth20-30	-0.009	-0.002	-0.001	-0.000	-0.015	-0.001	0.031***	-0.017	0.001
	(0.013)	(0.005)	(0.005)	(0.009)	(0.010)	(0.006)	(0.010)	(0.012)	(0.009)
Mother Age at birth31-40	-0.001	-0.001	0.001	0.011	-0.019*	-0.002	0.049***	-0.030**	-0.004
	(0.015)	(0.006)	(0.006)	(0.012)	(0.011)	(0.008)	(0.012)	(0.013)	(0.010)
Mother Age at birth40+	-0.055	-0.003	0.001	-0.022	-0.042	-0.018	0.022	-0.074***	-0.034
	(0.039)	(0.017)	(0.016)	(0.028)	(0.026)	(0.017)	(0.030)	(0.028)	(0.021)
Constant	0.055	0.036	0.020	0.023	0.109	0.065*	-0.148**	0.069	-0.072
	(0.079)	(0.037)	(0.022)	(0.059)	(0.066)	(0.039)	(0.060)	(0.071)	(0.048)
Number of Observations	13452	13482	13482	13453	13489	13478	13502	13486	13493
R-squared	0.08	0.03	0.02	0.06	0.06	0.02	0.06	0.07	0.07

Standard errors in parentheses.

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

Note: Model also includes state fixed effects.

Appendix Table 5: Summary of Studies on the Effect of Child Abuse on Future Criminal Behavior

Study	Outcome/Abuse	Data/Sample	Methodology	Results
Swantson et al. (2003)	Juvenile offending, aggression, and delinquency; Sexual abuse	Children with substantiated sexual abuse who were hospitalized in Australia. Interviews with 38 abused and 68 non-abused individuals and their parents nine years after intake. Controls were selected randomly from schools in Sydney.	Logistic regressions. Controls for age, sex, SES, and whether the child was living with biological parents at intake.	Effect of sexual abuse on self-reported criminal activity, Odds ratio=2.29 Effect of sexual abuse on official conviction records, Odds ratio=1.64 SES is not a significant predictor of criminality.
Widom (1989b)	Official records of arrest for delinquency, adult criminality, and violent criminal behavior; Sexual abuse, physical abuse, and neglect.	908 cases of substantiated physical and sexual abuse and neglect cases from 1967 through 1971 from one metropolitan area in the Midwest. Victims 11 years of age or less (drawn from an examination of the population of 2623 abuse and neglect petitions). Control group contained 667 cases.	"Matched cohorts" design. Matching is done on the basis of age, sex, race, and school child attended (as an approximation for SES).	Being abused or neglected increased arrests for delinquency.(Control=16.8, Treatment=26%), adult criminal record (Control=21.1%, Treatment=28.6%), and any violent criminal record (Control=7.9%, Treatment=11.2%).
Siegel and Williams (2003)	Official records of arrest for any offense, for a violent or property offense, for running a way, and for drug offense; Sexual abuse.	206 women treated in a hospital emergency room in a major city following a report of child sexual abuse during 1973-1975 and 205 women from the emergency room records of the same hospital who had no recorded child sexual abuse history. Control group matched on race, age and	McNemar's Test for bivariate relationships and multivariate logistic regressions. Separate analyses for delinquent adult and juvenile outcomes. No controls for family background.	Sexual abuse increases the odds of both juvenile and adult arrests (Odds ratios are 2.4 and 2.0, respectively).

		the date seen in the emergency room.		
Smith and Thornberry (1995)	Self reported prevalence and frequency of: general delinquency, serious delinquency, (e.g. armed robbery and burglary), moderate delinquency (e.g. joy-riding and simple assault), minor delinquency (minor theft and being loud and rowdy in public), and violent delinquency (an index of violent offenses). Official data include the number of times subjects had official contact with the police as a juvenile or an arrest as an adult; Maltreatment measured using on data from Child Protective Services records.	1000 students from the Rochester Youth Development Study are interviewed over a period of four and one-half years.	Logistic regressions. Controls for race, ethnicity, sex, SES, and family structure.	A history of maltreatment increases the probability of having an official record of arrest by 13 percentage points. A history of maltreatment increases the probabilities of having self-reported moderate and violent delinquencies by 13 and 11 percentage points, respectively. The effects on serious and minor delinquencies are 7 and 8 percentage points, but are not significant.
Maxfield and Widom (1996)	Official records of arrest for delinquency, adult criminality, and violent criminal behavior; Sexual abuse, physical abuse, and neglect.	See Widom, above.	See Widom, above. .	At an average age of 26, 29% of the abused and neglected children had been arrested in comparison to 21% of the controls. By the average age of 32.5, 49% of the abused and neglected children had been arrested while 38% of the controls had been arrested. 18% of the maltreated group had been arrested for a violent offense in comparison to 14% of the control group. Odds of being arrested as a juvenile were 1.8 times higher than for the matched controls. The odds for adult arrest and for arrest for a violent offense were 11.57 and 1.35 times higher, respectively. Maltreated females significantly more likely to have arrests for violence as juveniles and adults than non-abused and neglected females.

Zingraff et al. (1993)	Court records of complaints filed with the juvenile court; Physical abuse, sexual abuse, and neglect.	Randomly sampled one in three substantiated cases from the child abuse and neglect registry of an urban North Carolina county during 1983-1989. Comparison groups randomly drawn from the county's public school population and the county's welfare caseload. Maltreatment measures from the substantiated social service agency records.	Logistic regressions. Controls for age, sex, race, and family structure	Maltreated children are at a higher risk of delinquency in comparison to the school based sample (14% versus 5%). 9% of the controls from the welfare caseloads were referred to the juvenile court on delinquency complaints. No significant differences between the groups for violent or property offenses.
English, Widom, and Brandford (2002)	Juvenile and adult arrest records from local, state, and federal law enforcement agencies 15-24 years following dependency; Abuse measures include injury, sexual abuse, sexual exploitation, and negligent treatment.	877 substantiated cases of child abuse and/or neglect from court dependency records during 1980-84 from a large urban area of the State of Washington and 877 cases of non-abused and non-neglected matched control group.	Matched cohorts design with control cases matched based on the basis of age, race, ethnicity, gender, and family social class. Univariate, bivariate, and multivariate statistical techniques were used to analyze the data.	Overall, 19.6% of the abused and neglected group versus 4.1% of the controls had a juvenile arrest record (Relative risk=4.8) and 41.7% of the abused and neglected group versus 21.05 of the controls had an adult arrest (Relative risk=2). Abused and neglected males are 5 times more likely to be arrested as a juvenile (32% versus 6%) and about two times more likely to be arrested as an adult (59.5% versus 31.6%). Abused and neglected females are 4 times more likely to be arrested as a juvenile (64.3% versus 32.3%) and twice as likely to be arrested as an adult compared to controls (25.8% versus 11.5%)
Widom (2000)	Arrest records, suicide attempts, diagnosis of antisocial personality disorder, alcohol abuse and/or dependence; Maltreatment measures include childhood physical abuse, sexual abuse, and neglect.	See Widom, above.	See Widom, above.	Odds of arrest for a juvenile offense are 1.9 times higher among maltreated than among controls (31.2% versus 19%) and odds of arrest for an adult crime are 1.6 times higher (48.4% versus 36.2%). 18.8 % of the maltreated and 7.7% of the controls had suicide attempts; 18.4% of the maltreated and

				11.2% of the controls had antisocial personality disorder; 54.5% of the maltreated and 51% of the controls had alcohol abuse/dependence. Larger effects on suicide attempts and alcohol abuse/dependence for females than for males.
Rebellon and Van Gundy (2005)	Detailed measures of self-reported delinquency (e.g. theft, robbery, burglary, gang fights, assault); Abuse measure is physical abuse.	Data from the 1st (1976), 2nd (1977), and 3rd (1978) waves of the National Youth Survey.	Negative binomial estimation. Demographic and social controls are included.	Physical parental abuse is associated with an increase of 97 percent in violent offense counts and an increase of 240 percent in property offense counts controlling for demographics.
Grogan-Kaylor and Otis (2003)	Number of arrests experienced as a young adult for violent crimes and property crimes; Abuse measures include physical abuse, neglect and sexual abuse.	See Widom, above.	OLS and Tobit regression analyses	No statistically significant effects in OLS. Tobit analyses suggest that neglected children averaged 0.45 more arrests (a 38% increase from the mean) than nonneglected children and the effect is statistically significant. Physical abuse and sexual abuse increase the number of arrests by 0.18 (a 16% increase from the mean) and 0.09 (8% increase from the mean), respectively, but the effects are not significant.