The Changing Determinants of Juvenile Crime: Evidence from U.S. Micro Data

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Abstract

Crime rates in the US have declined substantially between the 1980s and 2000s. We use individual level data to examine these trends. Notably, participation declines among those from disadvantaged family backgrounds, those with lower skills, and those in urban areas. We test a number of theories that aim to explain the fall in crime, including the legalization of abortion, changing demographics, the declining exposure to lead, and changes in demand and supply of drugs. We find little support for the former three. On the other hand, improving labor market opportunities for the low skilled may explain some of the decline in crime.

Keywords: juvenile crime; decline in crime; property crime; violent crime; substance use

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1 Introduction

It is well documented that crime rates in the United States have declined substantially between the 1980s and 2000s. Total crime rate was 5949.97 in 1980 and 4124.70 in 2000; violent crime rate declined from 596.6 to 504.5 and property crime declined from 5353.3 to 3658.1.[1] Academic research and popular press have advanced numerous explanations in an attempt to explain the drop in crime. Key theories relate to: increasing police numbers and improvements in their strategies; legalization of abortion; changes in crack and other drug markets; changing demographics, in particular aging of the population; strong economy as well as changes in the structure of earnings and employment opportunities; the death penalty; tougher gun control laws; changes in immigration policies; improved security systems; environmental factors - reduction in exposure to lead. In this paper we use individual level data to examine some of these existing theories.

Most previous studies on the causes of decline in crime rely on some level of aggregate data. We use individual level data from the National Longitudinal Survey of Youth 1979 and 1997 (NLSY79 and NLSY97). The data include a range of questions relevant to risky and criminal activity, including theft, drug sales, use of force, causing injury to someone, causing property damage, hitting someone, and fighting. We focus on property crimes, crimes of violence, drug supply and substance use (marijuana and hard drugs). We document similar trends in crime statistics to those recorded in the official reporting outlets. For 14 -19 years old men, property crime participation declines from 41% in NLSY79 to 17% in NLSY97, violent crime drops from 18% to 11%, and cocaine and hard drugs use drops from 20% to 7%.[2] We also document an increase in the proportion of individuals who have ever been presented with a police charge from 19% to 28% (conditionally on

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[1]Crime rate per 100,000 population. Data are from the Uniform Crime Reporting Statistics, US Department of Justice. Violent crime includes murder and non-negligent manslaughter, forcible rape, robbery and aggravated assault. Property crime includes burglary, larceny theft, and motor vehicle theft.

[2]Our definitions of property and violent crime are subject to data availability and therefore different from crimes included in these categories in the official statistics. Details on variables construction are in Section 2.

committing a violent or property crime).[3]

There are four main parts to our analysis. First, we document the basic facts and trends relevant to youth crime in the US between the 1980s and 2000s. Youth who participate in risky behaviours and crime differ from those who do not in a range of personal and family background characteristics. These differences in characteristics are persistent over time. Second, we examine the incidence of crime at the individual level and analyse the trends in the determinants of crime and substance use participation. We analyze the roles of family background characteristics, socioeconomic factors, skills, and state level aggregates of economic conditions and criminal justice system in youth crime participation. Taking into account compatibility issues, the model of determinants of crime is estimated for men and women between 14 and 19 years old. Relationships between some explanatory variables are fairly stable across the two cohorts; however, we also record some important changes. Most notably, we find declines in crime participation among those from disadvantaged family backgrounds and those with lower ability. We also record changes in how crime is distributed by geographical location and urban status. Third, we test a number of theories that aim to explain the drop in crime in the US. We explore the role of processes such as legalization of abortion, changes in demand and supply of crack and other drugs and changing demographics. We ask what would be the prevalence of different types of crime if there was no change in the distribution of family structure, no change in distribution of hard drugs consumption or no change in the distribution of demographic characteristics. This analysis shows that changes in the demographic characteristics of youth and changes in the observable characteristics of ''solo-parented'' or ''teen-mother'' families, do not explain the decline in crime rates. Changes in demand and supply of cocaine, crack and other drugs has the potential to explain an important fraction of the decline in crime. Fourth, we analyze the consequences of crime participation. There is

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[3]Charge rates in population, unconditional on criminal participation are 12% in NLSY79 and 14% in NLSY97. Similarly to other crime variables, whether or not an individual was ever charged is self-reported, therefore our measures do not necessarily correspond to the official statistics.

some evidence of changing selection into crime participation, increasing conviction rates and changing attractiveness of crime have the potential to explain some of the decline in crime.

A number of recent studies compare the differences in skill distribution and skill acquisition of young people in the 2000s and their predecessors in the 1980s. For example, Altonji, Bharadwaj and Lange (2012) show that the later generation is more skilled than the previous one and that the skill distribution has widened over time. Blacks and Hispanics have gained relative to whites, and women have gained relative to men. Parents of the later cohort are more educated, older and more likely not to have a domestic partner. Changes in individual and household characteristics are accompanied by important changes in the aggregate economic and social environment. The real GDP per capita grew by 1.8% in the 1980s and by 3.7% in the 2000s. The annual unemployment rate fell from 7.2% to 4.2% between the 1980 to 2000. The growing economy can potentially affect crime participation either directly (e.g., by improving individual opportunities at the legal markets) or indirectly, through local government budgets. The latter would be reflected, for example, in spending on police protection and prisons.[4] Expenditures on police protection have increased from 0.5% of GDP in 1980 to 0.7% of GDP in 2000.[5] Additionally to increasing budgets, police forces in many US cities went through multiple reforms, including introduction of technology and community involvement (see, for example, Grant and Terry, 2004).

There is a large literature that explores the reasons behind the decline in crime in the US. Donahue and Levitt (2001), Levitt (2004), Fox (2005), and Spelman (2005), among others, focus on demographic factors, such as aging population, increased access to abortion in the 1970s and increased prisoner incarceration. Corman and Mocan (2000), Eck and

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[4]See Levitt (2004) for further discussion on the relationship between the aggregate state of economy and crime participation.

[5]Source: US Bureau of Economic Analysis, Government current expenditures: State and local: Public order and safety: Police and US Bureau of Economic Analysis, Gross Domestic Product.

Maguire (2005), Levitt (2004), among others, focus on the effects of public policy shifts, such as increased number of police officers, innovative policing strategies, gun control laws and increased capital punishment. Blumstein and Rosenfeld (1998) and Raphael and Winter-Ebmer (2001), among others, explore changing effects of socioeconomic factors, such as strong economy in the 1990s and decrease in the illegal drug trade. Most of these studies report some positive contributions of these changing factors to the decline in crime. Levitt (2004) argues that the increased police presence, increased incarceration, receding of crack cocaine trade, and the legalization of abortion in the 1970s explain the entire drop in crime in the 1990s; whereas nearly half of the overall decline is due to the legalization of abortion. On the other hand, the strong economy of the 1990s, changing demographics, better policing strategies, changes in gun control laws, concealed weapons laws and increased use of capital punishment do not explain the decline in crime. Reyes (2007), Nevin (2000) and Nevin (2007) explore the importance of environmental factors, specifically, childhood lead exposure. Reyes (2007) attributes 56% of the overall decline in crime to reduction in the use of lead.

All of the above studies use some level of aggregate data to understand the decline in crime in the US. We use individual level data to perform the analysis and our results contribute new findings to the existing literature. We do not find the access to abortion to be an important factor behind the decline in crime.[6] There is not much change in the selection into "solo-parented" or "teen-mother" families and the changing proportions of such families in the population do not explain the decline in crime. On the other hand, crime participation of individuals in such families has declined substantially between the 1980s and 2000s, which suggests that other processes, such as changing economic conditions, improvements in social security systems, and increasing access to quality education, have affected crime participation incentives and/or benefits. These possible explanations are

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[6]The theory suggests that the legalization in abortion during in the 1970s could have resulted in the reduction of the numbers of unwanted children who would have grown to become delinquents.

supported by a number of observations. For example, between the 1980s and 2000s Federal welfare spending out of GDP on services for families and children has increased by almost 20%, although other spendings, such as on education or health did not increase over time.[7] We document a substantial decline in crime participation among individuals of lower ability (measured by the AFQT), which suggests that improving labor market opportunities or welfare options for this particular group could explain some of the decline in crime in the US. This finding is consistent with the widely documented relative increase in wage and labor force participation of the low skilled workers. We also find that other changes in demographic factors, such as parental background, have only a minor effect on the decline in crime. Similar to previous studies, we find a relatively large decline in crime in large metropolitan areas. Previous studies explain these declines citing strong anti-crime reforms in large cities. This theory is consistent with our findings. Finally, differential changes in police presence or lead pollution across states cannot explain the decline in crime.

The paper proceeds as follows. Section 2 describes the datasets in detail. Our main empirical results and analysis are reported in Section 3. Section 4 analyses the relationship between risky behaviours and later life socio-economic outcomes. Section 5 concludes.

2 Data

The data are from the 1979 and 1997 waves of the National Longitudinal Survey of Youth (NLSY) including the Geocode for both surveys. NLSY79 provides a nationally representative sample of 12686 young men and women who were 14 - 22 years old in 1979, and NLSY97 samples 8984 individuals who were 12-16 years old in 1997. Our sample includes the random cross-sectional samples in the NLSY, supplemented with the oversamples of

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[7]Source: Federal Budget Historical Tables 3.2, 5.1, 7.1.

blacks and Hispanics (using the appropriate population weights in all calculations).[8] .

The data contain detailed information on individuals, including measures of cognitive skills, education, labor market activity, and other family and personal characteristics. Many of these variables are compatible across the 1979 and 1997 cohorts, but some require further adjustments to facilitate comparison across samples. We follow Castex and Dechter (2014) to achieve compatibility where applicable. Using the NLSY Geocode we match each individual with state level criminal justice system data and measures of economic environment. These measures include crime rates per capita, police rate per capita, average education level and unemployment rate.

NLSY79 and NLSY97 report individual risk-taking behavior and criminal activity information. In NLSY79 crime information is reported in 1980 and corresponds to activities since last interview. In NLSY97 most questions about criminal activity are available for every year between 1997-2011 and refer to the period since last interview. We focus on youth aged between 14 and 19 years old. In our analysis we compare year 1980 outcomes from NLSY79 with 1997-2001 outcomes from NLSY97. Both surveys include a range of questions relevant to criminal activity, including theft, drug sales, use of force, causing injury to someone, causing property damage, hitting someone, and fighting. We define two major crime categories, property crime (or economically motivated crime) and violent crime. Property crime includes stealing something, shoplifting or selling hard drugs.[9] Attacking someone, injuring someone or using force to get something are categorized as violent crimes. More specifically, in NLSY79 violent offences are indicated if respondents answer positively to "Attacked someone with the idea of seriously hurting or killing them" or " Used force or strong arm methods to get money or things from a person". In

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[8]For some estimations we construct alternative sets of weights to evaluate effects of changing distributions of demographic characteristics on labor market outcomes.

[9]Both surveys have questions about the value of stealing, stealing more or less than $50. Levitt and Lochner (2001) include only the high stakes stealing of more than $50 in their specification of property crime. We deviate from this specification due to compatibility issues. NLSY79 does not distinguish between low and high shoplifting values and question about stealing excludes shoplifting activity. NLSY97 does not distinguish whether stealing was from a store or via different means.

NLSY97 violent crime includes those positively responding to "Since the last interview, have you attacked someone with the idea of seriously hurting them or have had a situation end up in a serious fight or assault of some kind?".[10] Both surveys also provide information on substance use, alcohol, marijuana and hard drugs (such as cocaine and heroin) consumption. Our analysis focuses on marijuana and hard drugs use.[11]

We also use criminal charges as an additional measure of criminal participation. In NLSY79, in the 1980 questionnaire, all respondents are asked whether they have ever been booked or charged for breaking a law. In NLSY97, in 1998-2002, respondents who were arrested since last interview are asked whether the police has charged them with an offence. In 1997, the survey asks those who have ever been arrested a similar question. For NLSY97, we construct a variable which indicates whether an individual has ever been charged for each year from 1997 to 2002, compatible with the NLSY79 variable.

It is important to emphasize that our crime data measures participation in risk-taking behaviors more generally and it is self-reported. Some studies argue that there is a strong positive relationship between self-reported crime and official arrest data (see for example Farrington 1973). On the other hand, Levitt and Lochner (2001) note important racial discrepancies between the official data and self-reports in NLSY79. Specifically, Levitt and Lochner (2001) argue that there is a large discrepancy between relatively low numbers of crime activities reported by blacks in NLSY79 when comparing to the official data. We encounter a similar issue in NLSY97. Some studies argue that the differences between the official and self-reported data arise because most active offenders are not participating in the survey, accounting for such sample selection reconciles most of the observed racial

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[10]This question is available for 1998-2011 waves. In 1997 respondents are asked "How many times have you attacked someone or have had a situation end up in a serious fight or assault of some kind in the last 12 months?", we use this variable to generate the violent crime indicator in 1997.

[11]There is limited information on marijuana and alcohol use. Marijuana use is available for 1980 and 1998-2001, in NLSY79 and NLSY97, respectively. Both surveys ask whether the respondent consumed alcohol in the past 30 days, but this information is only available for individuals under 18 years old in NLSY79. We construct an alternative measure on whether an individual has ever consumed alcohol, which is available for both cohorts.

discrepancies (Farrington, 1973; Elliott and Ageton, 1980; and Hindelang, Hirschi, and Weis, 1979) .

Both data sources contain comparable measures of cognitive skills, education, labor market activity, and other family and personal characteristics. Cognitive skills are captured by the ASVAB, which is a sequence of tests that cover basic math, verbal, and manual skills. We construct age-adjusted Armed Forces Qualifications Test (AFQT) based on based on scores from Arithmetic Reasoning, Numerical Operations, Word Knowledge and Paragraph Comprehension tests. The NLSY79 and NLSY97 record family income in early survey years; we use the average family income (in 2007 dollars) when participants were 16-18 years old, excluding those not living with their parents at that time.[12] Family structure information is provided by an indicator variable for whether both parents were living with the child when he/she was 14 years old in the NLSY79 and in 1997 (i.e., ages 13-17) in the NLSY97. We define individuals as being born to teenage mothers if their mothers were twelve to nineteen years old at the time of pregnancy.

We use a set of state level variables. Unemployment rates are from the Bureau of Labor Statistics (BLS); crime statistics and police rate are from the FBI, Uniform Crime Reports. Lead exposure in childhood state level data are from Reyes (2007), we use 1975 levels for the NLSY79 cohort and the average of 1980 and 1985 indicators for NLSY97 cohort.

3   Results

There are three main parts to our analysis. First, we document the basic facts and trends relevant to youth crime in the US over the twenty years. Second, we examine the incidence of crime at the individual level. Third, we evaluate a number of theories that aim to explain the drop in crime levels.

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[12]When income is available only for a subset of ages, we use the average of available measures.

3.1 Trends in crime participation

Tables 1 and 2 report key demographic characteristics, aggregate statistics and criminal justice system measures for NLSY79 and NLSY97, for men and women, respectively. Columns (1) and (2) report these statistics for the entire sample, the remaining columns focus on individuals who report crime participation or substance use. We compare statistics in columns (1) and (2) to identify trends in the entire population. The proportion of individuals coming from "solo-parented" families is increasing; average parental education is increasing; the proportion of Hispanics is higher in the 2000s; and there is a change in geographical distribution (notably, the proportion of urban population is increasing). In terms of aggregate conditions, unemployment rate is lower, crime rates are declining and there is higher police presence in the 2000s.

Columns (5)-(10) in Tables 1 and 2 report statistics for those who participate in crime. Compared to "non-criminals, they are more likely to be from single-parent families; to be born to "teen-mothers"; have lower AFQT scores; to have less educated parents; they are more likely to be from larger metropolitan areas, more pronounced for those in the property crime group. Columns (11)-(14) report results for two types of substance users. The differences in demographic characteristics between these groups and the overall population are relatively small. Male substance users are more likely to be from "solo-parented" families and urban areas. The time trends in demographic characteristics for different crime subgroups are similar to those of the general population.

Table 3 reports crime and substance use rates. Between the 1980 and 2000s there were declines in every criminal activity and substance use for men. Property crime rate declines from 41% to 17%, violent crime rate drops from 18% to 11%, cocaine and hard drugs use drops from 20% to 7%, marijuana use declines from 49% to 28%, and alcohol consumption declines for every age group. Crimes rates are substantially lower for women and there is no consistent decline in female crime rates between 1980 and 2000s.

Property crime rate declines from 30% to 13%, violent crime rate is around 7% in the 1980 and 6% in the 2000s. The rates of hard drugs and marijuana use decline from 21% to 8% and 46% to 27%, respectively. In Appendix Tables 1 and 2 we report crime rates for each cohort by age, for men and women, respectively.

3.2 Statistical determinants of crime

We examine the incidence of crime at the individual level using the following linear probability model,[13]

$$Y_{it}^j = \beta_0 + \beta_1 NLSY97_i + \mathbf{X}_{it}\beta_2 + NLSY97_i\mathbf{X}_{it}\beta_3 + \epsilon_{it}. \tag{1}$$

The variable Y_{it}^j is a $\{0,1\}$ indicator of crime participation of type j, or substance use of type j. Each individual i is from the NLSY79 or NLSY97 sample, the variable $NLSY97_i$ indicates the cohort. In NLSY79 crime and substance use are reported in 1980 only; in NLSY97 crime variables are collected over the 1997-2001 period; t indicates year and is relevant for the NLSY97 cohort only. Vector $\mathbf{X}_{it}$ includes individual and family characteristics. The main explanatory variables are individual and family background characteristics, socioeconomic factors, skills, and state level indicators of economic conditions and criminal justice system. Family background characteristics include intact family indicator, "teen-mother" indicator, race, metro status and geographic characteristics. Socioeconomic factors include family income and parental education. Cognitive skills are captured by the AFQT scores. We also include age, ethnicity and race, school enrollment status and high school graduate indicator. We examine how the relationships between crime participation and various factors and characteristics included in $\mathbf{X}_{it}$ have changed over time. The parameters in vector β_3 measure these changes. Taking into account other compatibility issues, the model of determinants of crime is estimated for men and women

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[13]We estimate the model using the OLS; using a probit model leads to similar conclusions.

between 14 and 19 years old.

Table 4 reports results for crime participation, substance use and criminal charges. In Appendix Table 3 we report estimation results using a specification that includes a restricted set of variables, only including geographical measures and state level aggregates. The extended set of controls in Table 4 also includes individual characteristics and parental background variables.

3.2.1 Violent Crime and Property Crime

Columns (1)-(4) in Table 4 report estimation results for crime participation. Columns (1) and (2) report results for violent and property crime participation for men, respectively. Most relationships between crime participation and observable characteristics are stable over time. Older age and enrollment in school are negatively associated with crime participation. Some relationships are changing over time. In 1980, men from "solo-parented" families and "teen-mother" families are more likely to participate in violent or property crime. These relationships weaken in the 2000s, especially for violent crime participation. Individuals with higher AFQT scores are less likely to participate in violent or property crime in 1980; in the 2000s the negative relationship between cognitive skills and property crime participation is not evident. In 1980, property crime is more prevalent in large urban areas but not in the 2000s. State unemployment rate is positively correlated with crime in 1980 but not in the 2000s. We do not find any relationship between the state police rate and any type of crime participation.

Columns (3) and (4) report results for crime participation for women. Individual and family characteristics do not explain much of the crime participation for women. Notably, there are some geographical changes in crime participation; for example, declining crime rates in North-Central US. However, we do not observe declines in crime rates in large urban areas as we see for men. There is a negative correlation between AFQT scores and

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female violent crime participation, but no similar pattern for property crime. Similarly to men, the coefficient of AFQT score is positive for property crime participation for the 2000s.

3.2.2 Substance Use

Columns (5)-(8) in Table 4 report estimation results of equation (1) to analyze the statistical determinants of substance use for men and women, columns (5)-(6) and (7)-(8), respectively. Men and women display similar patterns in terms of the statistical determinants of substance use as well as in changes between 1980 and 2000s. Geographical patterns of substance use are changing over time, the prevalence is lower in the South, especially for marijuana consumption. In 1980, the use is higher in large urban areas but this relationship is declining in the 2000s. Substance use is lower among blacks and hispanics in 1980, but much less so in the 2000s. Youth from "solo-parented" families are more likely to use marijuana but no similar pattern recorded for cocaine use; there are no changes in these relationships over time. Higher AFQT scores are negatively associated with substance use in 1980 but not in the 2000s. Interestingly, higher parental education is positively associated with substance use. For men, school enrollment is negatively correlated with substance use in both 1980 and 2000s. High school graduation is negatively correlated with marijuana use for men and cocaine use for women in the 2000s. For men, state unemployment rate is positively correlated with crime in 1980 but not in the 2000s. For women, we do not observe any correlations between crime participation, substance use, and state level measures of unemployment or police rate.

3.2.3 Criminal Charges

An alternative measure of criminal activity is criminal charges. In both NLSY79 and NLSY97, respondents were asked whether they have ever been presented with charges.

We construct a $\{0, 1\}$ indicator for criminal charges and estimate an empirical model similar to that specified in equation (1). We assume that charges are presented against an individual who has conducted crimes of relatively high severity. The probability of charges for men in 1980 are lower than in the 2000s; the rates are 12% and 14%, respectively, see Table 3. When limiting these statistics to those who report violent or property crime participation, the rates are 19% and 28%, respectively. This overall increase in charges despite the decline in crime participation aligns with the theory of improving policy strategies and coverage.

Columns (9)-(12) in Table 4 report estimation results for men and women, in columns (9)-(10) and (11)-(12), respectively. We report results for the entire sample and for a subsample of those who report either violent crime or property crime participation. For men in 1980, there is a prominent geographical distribution of criminal charges, with a higher concentration in the Western states. The distribution is more even across regions in the 2000s. There are no such geographical patterns for women. For women, there is a significant decline in criminal charges in large metropolitan areas. In 1980, for men, being from a "solo-parented" family, "teen-mother" family, and lower family income are associated with a higher likelihood of criminal charges. These relationships are less pronounced in the 2000s. The negative relationship with the "teen-mother" variable is not present in the 2000s (especially for the subgroup of those who have participated in crime); the negative relationship between the likelihood of criminal charges and family income is also not observed in the 2000s. For women, we observe a similar pattern for the relationship between family income and charges; however, there is no statistically significant relationship between the family structure and criminal charges, in 1980 or 2000s. For men, higher AFQT scores are associated with a lower likelihood of charges; such pattern is not observed for women. The likelihood of criminal charges is not correlated with state level measures of unemployment or police rate.

3.2.4 Discussion

We find that family background, individual ability and local environment matter and the roles of these individual characteristics in explaining risky behaviors are changing over time. It should also be noted that none of the regressions, using NLSY79 or NLSY97, can explain more than 11 percent of the variation in criminal participation and 9 percent in substance use. This result is consistent with other reports; for example, Levitt and Lochner (2001) note that explaining individual differences in criminal participation is difficult, even with an abundance of family-background, geographic, and ability measures.

Estimation results show changing patterns in crime and substance use participation by family structure, skills, and city size. There is a large number of theories that aim to explain the declining crime and substance use participation. One of the more popular theories to explain the decline in crime in the US is related to legalization of abortion, which could lead to a less negative selection into "solo-parenting" and "teen-mothers". This explanation seems to be consistent with the diminishing positive correlations between being from a "solo-parented" or "teen-mother" family and crime participation. Alternatively, the decline in crime participation of youth from the more disadvantaged family backgrounds could be due to introduction of better welfare programs or improved access to quality education that affect disadvantaged families. On the other hand, improving employment opportunities for the less skilled workers could explain the declining negative relationship between AFQT scores and crime; this interpretation is in line with the extensive literature that documents relative increases in wage rates and labor force participation of low skilled workers between the 1980s and 2000s (job polarization). It is also in line with Mocan and Rees (2205) who argue that better employment opportunities may be effective tools for reducing juvenile crime.

Changes in employment opportunities and labor force participation may also explain the differences in decline in crime between men and women. For example, Englehardt,

Rocheteau, and Rupert (2008) show that the same forces that have likely driven the rise in female labor market participation can account for a 39 percent increase in female crime rate (in 1960 women committed about 3 crimes per every one thousand persons, by 2003 that number increased to around 15).

The simple OLS specification cannot evaluate a number of other explanations for the decline in crime. Especially those that assert that some factors or policy reforms could lead to a universal decline in crime. These explanations include changing demographics (specifically the changing age distribution); receding crack epidemic; better policing strategies and changes in gun control laws; increasing police numbers, rising prison population and the decrease in lead emissions. We revisit some of these theories in the next Section.

3.3   Evaluating Alternative Theories and Explanations

We examine a number of potential explanations for the decline in crime. First, we evaluate the effects of changing demographics. We keep distributions of ability, parental income, parental education, and geographical location constant over time and evaluate whether the changing characteristics of the population can explain the decline in crime. We perform a similar analysis keeping distribution of drug consumption and family structure constant over time to evaluate the effects of receding drug use and legalization of abortion.

To perform the analysis we implement a reweighting procedure to keep distributions of variables of interest constant over time. We reweight the NLSY97 sample to match NLSY79 distributions of observable characteristics. To construct the weights, we follow the methodology developed in DiNardo, Fortin and Lemieux (1996). We pool data from both surveys and use Probit models to estimate the probability that an observation is in

the NLSY79, conditional on the variables of interest.[14] The estimated probabilities are used to construct the weights: $\psi(Z) = \frac{P(d1979|Z)}{1-P(d1979|Z)}$, where Z is the vector of variables of interest, $d1979 \in \{0,1\}$ equals 1 when an observation is taken from the NLSY79, and $P(d1979|Z)$ is the conditional probability of appearing in the NLSY79 conditional on observable characteristics Z. The weight function, $\psi(Z)$, is used to reweight the observations in the NLSY97 to obtain nearly equal distributions of the variables of interest across the two surveys.

Tables 5 and 6 report summary statistics of crime participation and substance use for the reweighted NLSY97, for men and women, respectively. In column (3) we address differences in age distribution across samples and show that if the age distribution in NLSY97 was similar to that in NLSY79, the measures of participation rates would not be affected. To obtain results in column (4) we reweight the sample by demographic characteristics: AFQT scores, family income, parental education, and geographical location. Comparing to the original outcomes in column (2), there is practically no change in participation statistics in the reweighted sample. This result suggests that changing demographic characteristics of the 14-19 years old do not explain the decline in crime or substance use.

To evaluate the potential effects of the legalization of abortion on crime participation, we reweight the NLSY97 sample by family composition, i.e., keeping the distributions of "solo-parented" and "teen-mother" families constant over time. The results are reported in column (5), and they are practically identical to those of the original sample.

To further examine whether the legalization of abortion explains the decline in crime, we address the selection into "solo-parented" and "teen-mother" family structures. We reweight the NLSY97 sample to preserve the negative observable selection into the "teen-mother" families and "solo-parented" families as it was in NLSY79. Crime statistics using

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[14]These probability estimations use sampling weights provided by the BLS to achieve population representative samples.

these weights are reported in column (6). This reweighting method does not lead to any change in the estimated crime or substance use participation rates. This provides no support to the theory that the legalization of abortion is a major driving force behind the declining crime and substance use.

Column (7) reports summary statistics of crime and substance use participation rates when keeping constant the distribution of hard drugs and marijuana consumption. Crime participation rates in the reweighted sample are higher, suggesting that substance use might be an important determinant of crime participation. The interpretation of these statistics is not straightforward because we cannot assume that drug consumption is randomly distributed in the population. However, the higher crime participation rates in column (7) suggest that the decline in drug consumption has the potential explain some fraction of the decline in crime participation.

The reweighting exercise suggests that changing distributions of demographic characteristics of the American youth do not explain changes in crime and substance use participation. On the other hand, this result does not rule out that aggregate changes in demographic characteristics (such as rising age and education levels), macroeconomic conditions, or government policies can explain the decline in crime levels in the US.

3.3.1 Lead theory

Lead theory argues that childhood lead exposure can lead to psychological deficits that are strongly associated with aggressive and criminal behavior. To examine this theory we introduce state level lead measures into equation (1) as an additional control. Lead levels are obtained from Reyes (2007), Appendix Table 1, "Lead Exposure by State, 1975-1985". Reyes (2007) collects three types of lead levels: Gasoline Lead, Per-capita Lead and Air Lead, by state and reports them for 1975, 1980 and 1985. There is a significant drop in lead levels across the US due to legislation. In the late 1970s in the US, lead was removed from

gasoline under the Clean Air Act. Our oldest individual in NLSY97 sample was born in 1980, thus relevant lead measures are the 1980 and 1985 levels. For NLSY79 we assume lead levels as in 1975.

We use gasoline lead levels because it appears to have the strongest impact on crime in Reyes (2007) estimations. We do not find support for the lead theory in our estimations. Most coefficients are not statistically significant and of the "wrong" sign for the NLSY79 cohort (i.e., negative effect of gasoline lead on crime in 1980, in the period when lead levels were substantial). Appendix Tables 4, 5 and 6 summarize estimations results for violent crime, property crime, substance use and charges.[15]

4 Crime, substance use, and later life outcomes

We explore relationships between crime participation and substance use at the age of 14-19 and later socio-economic outcomes, focusing on education level and wage at the age of 25. We estimate the following model,

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\begin{aligned}
outcome_i =& \gamma_0 + \gamma_1 NLSY97_i + \sum_{t=1997}^{2001} \gamma_{2t}\mathbf{I}_t + \gamma_{j3}crime_{jit} + \gamma_{4j}NLSY97_i * crime_{jit} \\
& + \gamma_{5j}substance\ use_{jit} + \gamma_{6j}NLSY97_i * substance\ use_{jit} + \mathbf{Z}_i\gamma_7 + \upsilon_{it},
\end{aligned}
\tag{2}
$$

where $outcome_i$ indicates either the years of completed education at the age of 25 or real hourly wage at the age of 25-30, of individual i. Each individual i is from the NLSY79 or NLSY97 sample, the variable $NLSY97_i$ indicates the cohort. Crime participation and substance use are indicated by $crime_{jit}$ and $substance\ use_{jit}$, where j states for type of the activity and t is the reporting year, 1980 for the NLSY79 cohort and 1998-2001 for the

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[15]Reyes (2007) uses US state level crime data for 1970-2002 from the Federal Bureau of Investigation, Uniform Crime Reports; her analysis includes violent crime, property crime and murder. Reyes (2007) finds robust positive correlations between lead levels and violent crime, some correlation with murder rates, and little or no correlation with property crime. In addition to using individual level data, our analysis uses different violent crime definitions and delivers very different outcomes.

NLSY97 cohort.[16]. Year fixed effects are controlled by the indicator $\mathbf{I}_t$ which takes the value of 1 if crime and substance use indicators refer to that year. Vector Z_{it} includes individual and family characteristics. The main explanatory variables are family background characteristics, socioeconomic factors, cognitive skills (measured by the AFQT score), and state level indicators of economic conditions and police presence. Family background characteristics include intact family indicator, teen mother indicator, number of siblings, race, immigrant status, metro status and geographic characteristics. Socioeconomic factors include family income and parental education. It should be noted that we are not attempting to estimate a causal relationship but a suggestive indication of relationships between crime participation and later life outcomes and how these relationships have changed over time.

Tables 7 and 8 report the results for men and women, respectively. Columns (1)-(4) show the outcomes for achieved education at the age of 25 and columns (5)-(8) for real wage rates at the age of 25-30. Our estimation results for the NLSY79 cohort are quite similar to those reported by Levitt and Lochner (2001). For men, in Table 7, comparing results in columns (1) and (3) to those in (3) and (4), violent crime participation is negatively correlated with schooling outcomes at the age of 25, but this relationship is weaker when personal characteristics are accounted for. This relationship is not changing over time. There is no statistically significant relationship between property crime and education at the age of 25. Real wages and violent crime participation are negatively correlated only in estimations that do not control for individual or family background characteristics. However, these negative correlations are not recorded for the NLSY97 cohort. The estimation results for wages also show a negative correlation between property crime participation and wages for the NLSY97 cohort but not for the NLSY79 cohort. The use of hard drugs is negatively correlated with education at the age of 25 without an evident change over time; the use of marijuana is negative correlated with education only for the later cohort.

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[16]Marijuana use is only available for 1998-2001 sample in NLSY97.

For women, in Table 8, violent crime participation is negatively correlated with education only for the later cohort. On the other hand, there is a positive correlation between property crime and education for the later cohort and no relationship for the earlier cohort. Violent crime participation is negatively correlated with wages without evident pattern of change over time. The correlations with substance use participation for women are similar to what we find for men. The use of hard drugs is negatively correlated with education at the age of 25 without an evident change over time; the use of marijuana is negative correlated with education only for the later cohort. For women we also record a negative correlation between the use of marijuana and wages, without an evident change over time.

The analysis of consequences of crime participation is inconclusive. There are no clear trends in the relationships between the risky behaviours and later life outcomes; moreover, the possible endogeneity concerns when estimating such relationships further complicates the interpretation of the results. For men, first, we do not find any change in correlations between crime participation and education. Second, there is no significant relationship between violent crime and wages; but there is an emerging negative correlation between property crime and wages in the 2000s. The latter result could reflect an increasing conviction rate, changing selection into "property criminals", or decreasing attractiveness of property crime and therefore lower crime participation for higher earners. For women, there is some evidence that the negative consequences of crime are changing in terms of education, but not in terms of wages. The former result could reflect changing selection into crime participation, increasing conviction rate, or increasing attractiveness of crime participation for women.

Substance use results are not very pronounced, especially for men. There is a negative correlation between hard drugs use and education, which may suggest that there are negative consequences of hard drugs use, these are consistent over time. The negative correlation between marijuana use and education for NLSY97 cohort (for men and

women) may suggest that the drug has become more popular among the less educated individuals in the 2000s. The results for women suggest that the use of marijuana is more popular among the lower earning women in both 1980 and 2000s.

5   Conclusion

The decline in crime between the 1980s and 2000s in the United States is well documented. There are numerous theories that explore the channels that led to this decline. We analyse the trends in youth crime participation and substance use, and examine some of the popular theories. We use rich individual level data for the 1980s and 2000s cohorts from the NLSY79 and NLSY97, supplemented by state levels of crime rates, police presence rates, demographic and economics conditions. The NLSY79 and NLSY97 provide a range of criminal activity and substance use measures, these are different from the activities usually reported in the official statistics but there are many similarities with the officially recorded trends.

We document a number of empirical findings. First, there are persistent differences in personal and family background characteristics of youth who participate in risky behaviors and crime differ from those who do not. Second, the roles of family background, individual ability and local environment matter in explaining risky behaviors are changing over time. Most notable are the changing patterns in crime and substance use participation by family structure, skills, and urban status. Third, we test a number of existing theories that aim to explain the drop in crime in the US. The changing distributions of individual and family background characteristics do not explain the decline in crime. This finding does not support the popular legalization of abortion theory. We cannot explain the decline in crime using cross-state variation in police numbers or socio-economic measures. On the other hand, changes in demand and supply of crack and other drugs, changes in the structure of earnings and employment opportunities, as well as anti-crime

reforms in large cities, have the potential to explain an important fraction of the decline in crime. Fourth, we analyze the consequences of crime participation. There is some evidence that the changing selection into crime participation, increasing conviction rates and changing benefits of crime participation have the potential to explain some portion of the decline in crime.

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Table 1: Summary statistics by criminal status, NLSY79 and NLSY97, men

	all		non-criminal		violent crime		property crime		ever been charged?		marijuana		hard drugs	
	79	97	79	97	79	97	79	97	79	97	79	97	79	97
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
age	16.5	16.4	16.5	16.4	16.3	16.3	16.4	16.3	16.7	17.0	16.7	16.6	16.8	16.8
black	0.12	0.12	0.12	0.12	0.15	0.15	0.11	0.10	0.12	0.14	0.10	0.11	0.06	0.04
hispanic	0.06	0.11	0.05	0.11	0.05	0.13	0.06	0.11	0.06	0.13	0.05	0.11	0.04	0.12
solo parent	0.19	0.30	0.16	0.28	0.28	0.38	0.23	0.36	0.33	0.42	0.23	0.35	0.22	0.35
teen mother	0.15	0.15	0.13	0.14	0.21	0.17	0.16	0.16	0.23	0.19	0.16	0.15	0.15	0.12
afqt	0.11	0.09	0.17	0.11	-0.12	-0.17	0.06	0.11	-0.17	-0.17	0.10	0.11	0.12	0.12
log(family income)	10.9	10.9	10.9	10.9	10.8	10.8	10.9	10.9	10.6	10.8	10.9	10.9	10.9	10.9
parental educ	12.9	14.0	12.9	14.1	12.5	13.5	13.0	14.1	12.4	13.4	13.1	14.1	13.3	14.2
enrolled at school	0.84	0.75	0.85	0.77	0.79	0.67	0.83	0.70	0.68	0.50	0.79	0.68	0.75	0.61
HS graduate	0.38	0.33	0.40	0.34	0.32	0.25	0.35	0.28	0.38	0.36	0.43	0.36	0.46	0.40
South	0.29	0.31	0.32	0.32	0.31	0.33	0.24	0.27	0.24	0.27	0.24	0.27	0.24	0.26
North East	0.21	0.18	0.20	0.18	0.19	0.16	0.22	0.21	0.18	0.19	0.23	0.21	0.23	0.21
North Central	0.34	0.29	0.34	0.30	0.33	0.29	0.35	0.27	0.34	0.31	0.34	0.27	0.33	0.23
SMSA	0.72	0.79	0.68	0.78	0.75	0.80	0.78	0.82	0.77	0.76	0.77	0.82	0.78	0.83
local unempl	7.04	4.50	7.01	4.53	7.00	4.38	7.08	4.35	6.99	4.67	7.07	4.47	7.03	4.60
state violent rate	568	495	552	493	575	517	594	496	578	469	590	490	581	489
state prop rate	5302	3722	5187	3715	5365	3808	5470	3710	5458	3692	5428	3686	5446	3706
state average educ	8.99	9.92	8.96	9.92	9.02	9.91	9.04	9.95	9.07	9.96	9.04	9.95	9.06	9.95
state police rate	240	536	233	535	237	550	251	538	238	519	248	537	252	538

Note: Property criminals include individuals who either steal something or sell hard drugs. Violent criminals include individuals who either injure someone or use force to get something. "Hard drugs" takes the value of 1 if the repondent reports consuming drugs such as cocaine and heroin since last interview, and zero otherwise. "Marijuana" takes the value of 1 if respondent reports consuming it since last interview, and zero otherwise. "Ever been charged" corresponds to individuals who have been booked or charged for breaking a law.

Table 2: Summary statistics by criminal status, NLSY79 and NLSY97, women

	all		non-criminal		violent crime		property crime		ever been charged?		marijuana		hard drugs	
	79	97	79	97	79	97	79	97	79	97	79	97	79	97
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
age	16.6	16.5	16.6	16.5	16.5	16.1	16.6	16.3	16.4	16.3	16.2	16.3	16.4	16.4
black	0.12	0.13	0.13	0.13	0.18	0.17	0.09	0.08	0.12	0.11	0.13	0.12	0.13	0.12
hispanic	0.05	0.10	0.05	0.10	0.05	0.10	0.05	0.08	0.05	0.11	0.06	0.11	0.06	0.11
solo parent	0.20	0.32	0.18	0.30	0.26	0.48	0.22	0.38	0.17	0.27	0.16	0.27	0.18	0.29
teen mother	0.14	0.15	0.13	0.15	0.16	0.23	0.15	0.15	0.14	0.14	0.14	0.15	0.14	0.15
afqt	0.14	0.12	0.16	0.13	-0.15	-0.26	0.15	0.24	0.15	0.14	0.12	0.09	0.11	0.09
log(family income)	10.7	10.9	10.8	10.9	10.6	10.7	10.7	10.8	10.9	10.9	10.8	10.9	10.8	10.9
parental educ	12.8	14.1	12.8	14.1	12.5	13.6	13.0	14.4	13.0	14.1	12.8	14.0	12.9	14.0
enrolled at school	0.82	0.78	0.82	0.79	0.75	0.66	0.80	0.76	0.86	0.79	0.88	0.78	0.86	0.76
HS graduate	0.41	0.37	0.41	0.39	0.40	0.21	0.42	0.31	0.38	0.32	0.33	0.31	0.36	0.32
South	0.34	0.34	0.37	0.35	0.37	0.33	0.25	0.27	0.30	0.32	0.34	0.33	0.30	0.32
North East	0.19	0.17	0.18	0.16	0.15	0.21	0.22	0.22	0.21	0.18	0.19	0.17	0.20	0.18
North Central	0.31	0.28	0.29	0.29	0.30	0.27	0.34	0.26	0.34	0.29	0.35	0.30	0.35	0.30
SMSA	0.74	0.79	0.73	0.80	0.74	0.76	0.76	0.78	0.72	0.80	0.68	0.78	0.71	0.79
local unempl	6.99	4.48	7.05	4.50	6.81	4.32	6.89	4.37	7.05	4.47	7.01	4.51	7.04	4.49
state violent rate	574	498	574	497	546	510	573	496	567	500	546	497	564	496
state prop rate	5314	3729	5260	3734	5302	3756	5447	3675	5280	3727	5179	3736	5267	3723
state average educ	8.97	9.92	8.94	9.92	8.97	9.91	9.06	9.94	8.98	9.92	8.95	9.91	8.98	9.92
state police rate	240	538	238	536	238	543	247	546	241	539	233	535	238	536

Note: Property criminals include individuals who either steal something or sell hard drugs. Violent criminals include individuals who either injure someone or use force to get something. "Hard drugs" takes the value of 1 if the repondent reports consuming drugs such as cocaine and heroin since last interview, and zero otherwise. "Marijuana" takes the value of 1 if respondent reports consuming it since last interview, and zero otherwise. "Ever been charged" corresponds to individuals who have been booked or charged for breaking a law.

Table 3: Crime participation by cohort

	non-criminals	any crime (violent or property)	violent criminals	property criminals	shoplift	marijuana	hard drugs	alcohol	ever been charged?
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
					men				
NLSY79	0.53	0.47	0.18	0.41	0.33	0.49	0.20	0.70	0.12
N	2533	2533	2534	2533	2532	2534	2520	1297	2534
NLSY97	0.77	0.23	0.11	0.17	0.09	0.28	0.07	0.61	0.14
N	8863	8863	8865	8862	8865	8865	8780	8859	8865
					women				
Total	0.67	0.33	0.07	0.30	0.26	0.46	0.21	0.66	0.04
N	2639	2639	2640	2639	2638	2640	2634	1264	2640
Total	0.83	0.17	0.06	0.13	0.09	0.27	0.08	0.65	0.06
N	8664	8664	8664	8664	8664	8664	8599	8657	8664

Note: Property criminals include individuals who either steal something or sell hard drugs. Violent criminals include individuals who either injure someone or use force to get something. "Hard drugs" takes the value of 1 if the repondent reports consuming drugs such as cocaine and heroin since last interview, and zero otherwise. "Marijuana" takes the value of 1 if respondent reports consuming it since last interview, and zero otherwise. Alcohol takes the value of 1 if repondent consumed it in the last month, is available only for those under 18 in NLSY79. "Ever been charged" corresponds to individuals who have been booked or charged for breaking a law.

Table 4: Statistical determinants of criminal participation, substance use and charges, 1980 vs 2000s, OLS

	men		women		men		women		charges, men		charges, women	
	Violent crime	Property crime	Violent crime	Property crime	Mari-juana	Hard drugs	Mari-juana	Hard drugs	All	Any crime	All	Any crime
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
NLSY97, {0,1}	0.185	-0.220	-0.144	-0.264	-0.129	-0.106	-0.349	-0.751***	-0.405**	-0.641*	-0.108	-0.459
	(0.199)	(0.249)	(0.141)	(0.227)	(0.257)	(0.209)	(0.243)	(0.201)	(0.179)	(0.331)	(0.134)	(0.325)
South, {0,1}	0.021	-0.045	-0.001	-0.046	-0.119***	-0.012	-0.082**	-0.047	-0.097***	-0.133***	-0.009	-0.019
	(0.035)	(0.044)	(0.022)	(0.040)	(0.044)	(0.038)	(0.041)	(0.036)	(0.031)	(0.051)	(0.016)	(0.043)
North East, {0,1}	0.018	0.003	-0.016	0.085*	-0.032	0.012	0.041	0.057	-0.060*	-0.102*	0.013	0.013
	(0.038)	(0.047)	(0.022)	(0.045)	(0.047)	(0.042)	(0.046)	(0.040)	(0.032)	(0.054)	(0.019)	(0.048)
North Central, {0,1}	0.003	-0.013	-0.005	0.053	-0.067*	-0.029	-0.007	-0.008	-0.061**	-0.076	0.008	0.011
	(0.032)	(0.040)	(0.021)	(0.038)	(0.041)	(0.035)	(0.039)	(0.034)	(0.029)	(0.048)	(0.016)	(0.040)
Urban, {0,1}	0.036	0.116***	0.003	0.002	0.114***	0.070***	0.067**	0.027	0.036**	0.020	0.014	0.041
	(0.022)	(0.028)	(0.015)	(0.027)	(0.029)	(0.022)	(0.029)	(0.024)	(0.018)	(0.036)	(0.010)	(0.026)
State unempl.	0.001	0.011**	-0.003	-0.009*	0.011**	0.007	-0.005	-0.001	-0.003	-0.007	-0.002	-0.008
	(0.004)	(0.006)	(0.003)	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)	(0.003)	(0.006)	(0.002)	(0.006)
State police rate	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.000*	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
South*NLSY97	-0.038	-0.007	-0.008	-0.012	0.014	-0.024	-0.012	0.016	0.057	0.126*	-0.053**	-0.059
	(0.037)	(0.047)	(0.024)	(0.043)	(0.049)	(0.040)	(0.047)	(0.039)	(0.037)	(0.065)	(0.023)	(0.062)
North East*NLSY97	-0.024	-0.004	0.048*	-0.081	0.027	-0.029	-0.011	-0.065	0.071*	0.183**	-0.038	-0.062
	(0.041)	(0.052)	(0.026)	(0.050)	(0.055)	(0.045)	(0.055)	(0.044)	(0.040)	(0.074)	(0.027)	(0.071)
North Central*NLSY97	-0.002	-0.029	0.010	-0.098**	-0.015	-0.017	-0.091**	-0.033	0.056	0.141**	-0.047**	-0.054
	(0.034)	(0.044)	(0.023)	(0.041)	(0.046)	(0.037)	(0.045)	(0.037)	(0.036)	(0.064)	(0.023)	(0.062)
Urban*NLSY97	-0.045*	-0.102***	-0.017	-0.028	-0.081**	-0.058**	-0.075**	-0.050*	-0.038	-0.019	-0.042***	-0.113**
	(0.025)	(0.031)	(0.018)	(0.031)	(0.034)	(0.024)	(0.034)	(0.027)	(0.025)	(0.052)	(0.016)	(0.048)
State unempl. *NLSY97	-0.007	-0.018***	0.000	0.002	-0.017**	-0.006	-0.003	0.001	0.003	0.009	-0.001	0.007
	(0.005)	(0.006)	(0.003)	(0.006)	(0.007)	(0.005)	(0.007)	(0.005)	(0.005)	(0.009)	(0.003)	(0.009)

Continued next page

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Table 4 continued

	men		women		men		women		charges, men		charges, women	
	Violent crime	Property crime	Violent crime	Property crime	Mari-juana	Hard drugs	Mari-juana	Hard drugs	All	Any crime	All	Any crime
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
State police rate*NLSY97	0.000	-0.000*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Black	0.003	-0.079***	0.010	-0.096***	-0.107***	-0.132***	-0.177***	-0.173***	-0.054**	-0.086**	-0.039***	-0.086***
	(0.026)	(0.030)	(0.018)	(0.027)	(0.031)	(0.024)	(0.030)	(0.023)	(0.021)	(0.037)	(0.011)	(0.028)
Hispanic	-0.054*	-0.020	-0.024	-0.020	-0.078**	-0.085***	-0.143***	-0.101***	-0.035	-0.038	-0.001	0.002
	(0.028)	(0.035)	(0.018)	(0.032)	(0.034)	(0.026)	(0.034)	(0.028)	(0.024)	(0.038)	(0.014)	(0.034)
Solo parent	0.078***	0.073**	0.009	0.032	0.107***	0.037	0.095***	0.020	0.080***	0.103***	0.006	0.021
	(0.026)	(0.030)	(0.016)	(0.028)	(0.030)	(0.026)	(0.029)	(0.025)	(0.023)	(0.038)	(0.012)	(0.028)
Teen mother	0.058**	0.053*	0.003	0.042	0.042	0.017	0.046	0.002	0.044*	0.064*	-0.003	-0.019
	(0.028)	(0.032)	(0.017)	(0.030)	(0.032)	(0.026)	(0.031)	(0.026)	(0.023)	(0.037)	(0.012)	(0.029)
AFQT	-0.031***	-0.032**	-0.019**	-0.016	-0.024*	-0.024**	-0.031**	-0.006	-0.023**	-0.039**	-0.004	0.003
	(0.012)	(0.014)	(0.008)	(0.013)	(0.014)	(0.012)	(0.015)	(0.012)	(0.010)	(0.017)	(0.006)	(0.016)
ln (Fam inc)	0.011	0.000	-0.013	-0.034*	0.003	-0.004	-0.022	-0.058***	-0.035**	-0.054**	-0.033***	-0.063***
	(0.017)	(0.021)	(0.011)	(0.018)	(0.021)	(0.018)	(0.019)	(0.017)	(0.014)	(0.025)	(0.009)	(0.020)
Parental educ	-0.003	0.009**	0.001	0.010**	0.008*	0.010***	0.014***	0.008**	0.001	-0.001	0.003*	0.003
	(0.004)	(0.005)	(0.002)	(0.004)	(0.005)	(0.004)	(0.005)	(0.004)	(0.003)	(0.005)	(0.002)	(0.004)
Enrolled in school	-0.084***	-0.078**	-0.028	-0.045	-0.104***	-0.091**	-0.052	-0.031	-0.138***	-0.112**	-0.061***	-0.103**
	(0.031)	(0.037)	(0.019)	(0.033)	(0.037)	(0.036)	(0.035)	(0.031)	(0.031)	(0.049)	(0.018)	(0.044)
HS graduate	-0.025	-0.020	0.006	0.046*	0.029	0.030	0.047	0.063**	-0.013	-0.021	-0.019	-0.043
	(0.025)	(0.031)	(0.014)	(0.028)	(0.030)	(0.027)	(0.029)	(0.026)	(0.023)	(0.037)	(0.014)	(0.035)
Black*NLSY97	0.002	0.046	-0.010	0.048	0.092**	0.080***	0.059**	0.106***	0.052*	0.099*	0.011	0.052
	(0.030)	(0.034)	(0.020)	(0.030)	(0.037)	(0.025)	(0.035)	(0.024)	(0.029)	(0.054)	(0.015)	(0.045)
Hispanic*NLSY97	0.054*	0.014	0.012	-0.009	0.052	0.081***	0.093***	0.087***	0.033	0.071	-0.035*	-0.046
	(0.032)	(0.039)	(0.021)	(0.036)	(0.041)	(0.029)	(0.041)	(0.031)	(0.031)	(0.058)	(0.021)	(0.056)

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Table 4 continued:

	men		women		men		women		charges, men		charges, women	
	Violent crime	Property crime	Violent crime	Property crime	Mari-juana	Hard drugs	Mari-juana	Hard drugs	All	Any crime	All	Any crime
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Solo parent*NLSY97	-0.052*	-0.022	0.023	0.008	-0.034	-0.015	-0.003	0.026	-0.020	-0.052	0.015	0.046
	(0.028)	(0.033)	(0.018)	(0.031)	(0.034)	(0.028)	(0.034)	(0.028)	(0.028)	(0.048)	(0.017)	(0.043)
Teen mother*NLSY97	-0.070**	-0.042	0.019	-0.040	-0.049	-0.037	-0.048	-0.021	-0.046	-0.095*	0.027	0.044
	(0.031)	(0.036)	(0.021)	(0.034)	(0.038)	(0.028)	(0.036)	(0.028)	(0.030)	(0.053)	(0.020)	(0.052)
AFQT*NLSY97	0.014	0.040**	0.002	0.033**	0.033**	0.024*	0.050***	0.016	0.012	0.018	0.004	0.006
	(0.013)	(0.016)	(0.009)	(0.015)	(0.017)	(0.012)	(0.017)	(0.013)	(0.012)	(0.024)	(0.008)	(0.024)
ln (Fam inc)*NLSY97	-0.020	0.005	0.014	0.024	0.003	0.005	0.029	0.070***	0.037**	0.060**	0.019	0.054*
	(0.018)	(0.022)	(0.012)	(0.020)	(0.023)	(0.019)	(0.021)	(0.018)	(0.016)	(0.030)	(0.011)	(0.028)
Parental educ*NLSY97	0.000	-0.007	-0.001	-0.006	-0.006	-0.008*	-0.009*	-0.005	-0.003	-0.002	-0.005**	-0.018**
	(0.004)	(0.005)	(0.002)	(0.005)	(0.006)	(0.004)	(0.005)	(0.004)	(0.004)	(0.008)	(0.003)	(0.008)
Enrolled in school*NLSY9	0.031	0.001	-0.023	0.000	0.002	0.037	-0.019	-0.032	-0.025	-0.119**	-0.008	0.054
	(0.033)	(0.040)	(0.021)	(0.035)	(0.041)	(0.038)	(0.039)	(0.034)	(0.035)	(0.059)	(0.022)	(0.058)
HS graduate*NLSY97	-0.006	-0.026	-0.031*	-0.065**	-0.076**	-0.040	-0.033	-0.064**	-0.119***	-0.111**	-0.012	0.079
	(0.028)	(0.035)	(0.018)	(0.031)	(0.037)	(0.030)	(0.035)	(0.029)	(0.029)	(0.053)	(0.020)	(0.054)
const.	0.086	0.405*	0.259**	0.595***	0.359	0.208	0.568***	0.778***	0.602***	0.897***	0.425***	0.848***
	(0.189)	(0.237)	(0.130)	(0.210)	(0.236)	(0.202)	(0.215)	(0.192)	(0.158)	(0.272)	(0.103)	(0.243)
N	11444	11443	11331	11330	11399	11300	11304	11233	11444	3240	11331	2211
R2	0.037	0.095	0.027	0.072	0.084	0.067	0.093	0.075	0.086	0.115	0.048	0.069

Note: Property criminals are those who steal something or sell hard drugs. Violent criminals are those who injure someone or use force to get something. "Hard drugs" takes the value of 1 if consuming drugs such as cocaine and heroin since last interview is reported, 0 otherwise. "Marijuana" takes the value of 1 if consuming since last interview is reported, 0 otherwise. Criminal charges takes the value of 1 for individuals who have been booked or charged for breaking a law, 0 otherwise. "Any crime" corresponds to property or violent crime. Other controls include dummy variables for age, criminal and property crime rates at state level, and their intractions with NLSY97. Coefficients presented, standard errors in paranthesis. Omitted dummy variable is Western States. Standard errors are clustered at the individual level. Statistical significance is denoted as *10%, **5%, and ***1% levels.

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| | NLSY79, standard weights | NLSY97, standard weights | NLSY97, reweighted: | | | | |
| | | | by age | by demog-raphics | by family com-position | within family type | by substance use |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Non-criminals	0.53	0.77	0.77	0.77	0.78	0.78	0.67
N =	[2557]	[8886]	[8886]	[8886]	[8886]	[8886]	[8778]
Any crime	0.47	0.23	0.23	0.23	0.22	0.22	0.33
N =	2557	[8886]	[8886]	[8886]	[8886]	[8886]	[8778]
Violent crime	0.18	0.11	0.11	0.11	0.11	0.11	0.14
N =	[2557]	[8886]	[8886]	[8886]	[8886]	[8886]	[8778]
Property crime	0.41	0.17	0.16	0.16	0.16	0.16	0.26
N =	[2557]	[8886]	[8886]	[8886]	[8886]	[8886]	[8778]
Shoplift	0.33	0.09	0.09	0.09	0.09	0.09	0.13
N =	[2556]	[8886]	[8886]	[8886]	[8886]	[8886]	[8778]
Marijuana	0.49	0.28	0.28	0.28	0.28	0.27	0.48
N =	[2534]	[8862]	[8862]	[8862]	[8862]	[8862]	[8778]
Hard drugs	0.20	0.07	0.07	0.07	0.07	0.07	0.20
N =	[2540]	[8796]	[8796]	[8796]	[8796]	[8796]	[8778]
Alcohol (under 18)	0.70	0.61	0.61	0.62	0.61	0.61	0.70
N =	[1305]	[8871]	[8871]	[8871]	[8871]	[8871]	[8772]
Did ever drink?	0.80	0.77	0.76	0.77	0.76	0.76	0.83
N =	[2294]	[8817]	[8817]	[8817]	[8817]	[8817]	[8731]
Ever charged?	0.12	0.14	0.14	0.15	0.13	0.14	0.18
N =	[2557]	[8886]	[8886]	[8886]	[8886]	[8886]	[8778]

Note: Property criminals include individuals who either steal something or sell hard drugs. Violent criminals include individuals who either injure someone or use force to get something. "Any crime" corresponds to both, "violent crime" and "property crime". "Hard drugs" takes the value of 1 if the repondent reports consuming drugs such as cocaine and heroin since last interview, and zero otherwise. "Marijuana" takes the value of 1 if respondent reports consuming it since last interview, and zero otherwise. Alcohol takes the value of 1 if repondent consumed it in the last month, is available only for those under 18 in NLSY79. "Did ever drink" takes values of 0 and 1, and is available for most respondents. Participation rates presented, number of observations for each calculation is in brackets.

Table 6: Crime participation by cohort, reweighted, women

| | NLSY79, standard weights | NLSY97, standard weights | NLSY97, reweighted: | | | | |
| | | | by age | by demog-raphics | by family com-position | within family type | by substance use |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Non-criminals	0.67	0.83	0.84	0.84	0.84	0.85	0.75
N =	[2645]	[8685]	[8685]	[8685]	[8685]	[8685]	8599
Any crime	0.33	0.17	0.16	0.16	0.16	0.15	0.25
N =	[2645]	[8685]	[8685]	[8685]	[8685]	[8685]	8599
Violent crime	0.07	0.06	0.06	0.06	0.06	0.06	0.09
N =	2646	[8685]	[8685]	[8685]	[8685]	[8685]	8599
Property crime	0.30	0.13	0.13	0.12	0.12	0.12	0.21
N =	[2645]	[8685]	[8685]	[8685]	[8685]	[8685]	8599
Shoplift	0.26	0.09	0.09	0.08	0.08	0.08	0.13
N =	[2645]	[8685]	[8685]	[8685]	[8685]	[8685]	8599
Marijuana	0.46	0.27	0.26	0.26	0.26	0.25	0.46
N =	[2640]	[8664]	[8664]	[8664]	[8664]	[8664]	8599
Hard drugs	0.21	0.08	0.08	0.08	0.08	0.07	0.21
N =	[2638]	[8614]	[8614]	[8614]	[8614]	[8614]	8599
Alcohol (under 18)	0.66	0.65	0.65	0.64	0.65	0.62	0.73
N =	[1266]	[8673]	[8673]	[8673]	[8673]	[8673]	8593
Did ever drink?	0.72	0.78	0.78	0.78	0.77	0.76	0.84
N =	[2218]	[8643]	[8643]	[8643]	[8643]	[8643]	8567
Ever charged?	0.04	0.06	0.06	0.07	0.06	0.06	0.09
N =	[2645]	[8685]	[8685]	[8685]	[8685]	[8685]	8599

Note: Property criminals include individuals who either steal something or sell hard drugs. Violent criminals include individuals who either injure someone or use force to get something. "Any crime" corresponds to both, "violent crime" and "property crime". "Hard drugs" takes the value of 1 if the respondent reports consuming drugs such as cocaine and heroin since last interview, and zero otherwise. "Marijuana" takes the value of 1 if respondent reports consuming it since last interview, and zero otherwise. Alcohol takes the value of 1 if repondent consumed it in the last month, is available only for those under 18 in NLSY79. "Did ever drink" takes values of 0 and 1, and is available for most respondents. Participation rates presented, number of observations for each calculation is in brackets.

Table 7: Crime, substance use, and later life outcomes, OLS, men

	Education at 25; N=8428				Real wage at 25; N=5328			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NLSY97, {0,1}	-1.302*	-1.214*	0.315	0.438	-0.032	-0.017	0.161	0.170
	(0.680)	(0.688)	(3.894)	(3.876)	(0.070)	(0.071)	(0.417)	(0.418)
Violent crime	-1.031***	-0.971***	-0.557**	-0.484*	-0.079**	-0.079**	-0.039	-0.037
	(0.289)	(0.287)	(0.276)	(0.274)	(0.036)	(0.036)	(0.036)	(0.036)
Property crime	-0.299	-0.156	-0.211	-0.058	0.005	0.001	0.011	0.010
	(0.227)	(0.254)	(0.216)	(0.238)	(0.027)	(0.029)	(0.026)	(0.028)
Violent crime*97	-0.312	-0.288	-0.186	-0.161	0.113*	0.117*	0.100	0.103
	(0.486)	(0.488)	(0.481)	(0.482)	(0.065)	(0.065)	(0.063)	(0.063)
Property crime*97	-0.202	-0.098	-0.471	-0.304	-0.121***	-0.102**	-0.113**	-0.093**
	(0.408)	(0.433)	(0.393)	(0.415)	(0.046)	(0.048)	(0.045)	(0.047)
Hard drugs		-0.488		-0.622**		-0.019		-0.033
		(0.313)		(0.297)		(0.032)		(0.032)
Marijuana		-0.013		0.048		0.024		0.027
		(0.245)		(0.227)		(0.028)		(0.028)
Hard drugs*97		0.802		0.687		0.034		0.040
		(0.580)		(0.567)		(0.059)		(0.059)
Marijuana*97		-0.655		-0.742*		-0.063		-0.068
		(0.417)		(0.397)		(0.045)		(0.045)
individual and family background			+	+			+	+
R2	0.017	0.019	0.084	0.086	0.026	0.026	0.081	0.082

Note: All estimations include region, urban status indicators, and their interctions with NLSY97 indicator. Estimations in columns (3), (4), (6), (8) also incude Black, Hispanic, "Solo-parent", "Teen-mother" indicators; AFQT score, log Family Income, and Parental Education as well as their interactions with the NLSY97 indicator. "Property crime" takes the value of 1 if individual reports either steal something or sell hard drugs, and 0 otherwise. "Violent crime" takes the value of 1 if individual reports either injure someone or use force to get something, and 0 otherwise. "Hard drugs" takes the value of 1 if the repondent reports consuming drugs such as cocaine and heroin since last interview, and zero otherwise. "Marijuana" takes the value of 1 if respondent reports consuming it since last interview, and zero otherwise. Coefficients presented, standard errors in paranthesis. Standard errors are clustered at the individual level. Statistical significance is denoted as *10%, **5%, and ***1% levels.

Table 8: Crime, substance use, and later life outcomes, OLS, women

	Education at 25; N=8608				Real wage at 25; N=5558			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NLSY97, {0,1}	-0.864	3.238	-0.729	3.029	0.086	0.686	0.071	0.672
	(0.651)	(3.254)	(0.665)	(3.231)	(0.076)	(0.437)	(0.078)	(0.439)
Violent crime	-0.372	0.044	-0.310	0.113	-0.163***	-0.086**	-0.165***	-0.088**
	(0.310)	(0.297)	(0.307)	(0.293)	(0.043)	(0.040)	(0.043)	(0.040)
Property crime	0.230	0.258	0.303	0.322	-0.017	-0.013	0.007	0.006
	(0.195)	(0.186)	(0.210)	(0.199)	(0.029)	(0.028)	(0.033)	(0.031)
Violent crime*NLSY97	-1.735***	-1.390**	-1.674***	-1.336**	-0.026	-0.009	-0.020	-0.001
	(0.580)	(0.564)	(0.585)	(0.568)	(0.084)	(0.081)	(0.086)	(0.083)
Property crime*NLSY97	0.709*	0.553	0.957**	0.791**	0.005	-0.020	-0.013	-0.026
	(0.398)	(0.389)	(0.389)	(0.375)	(0.056)	(0.056)	(0.057)	(0.056)
Hard drugs			-0.552**	-0.607**			0.029	0.024
			(0.267)	(0.254)			(0.031)	(0.030)
Marijuana			0.251	0.309			-0.087***	-0.070**
			(0.215)	(0.201)			(0.031)	(0.029)
Hard drugs*NLSY97			0.053	0.149			0.043	0.049
			(0.548)	(0.534)			(0.082)	(0.082)
Marijuana*NLSY97			-0.635*	-0.702*			0.021	-0.015
			(0.384)	(0.372)			(0.060)	(0.057)
individual and family background			+	+			+	+
R2	0.012	0.070	0.013	0.071	0.031	0.115	0.034	0.118

Note: All estimations include region, urban status indicators, and their interctions with NLSY97 indicator. Estimations in columns (3), (4), (6), (8) also incude Black, Hispanic, "Solo-parent", "Teen-mother" indicators; AFQT score, log Family Income, and Parental Education as well as their interactions with the NLSY97 indicator. "Property crime" takes the value of 1 if individual reports either steal something or sell hard drugs, and 0 otherwise. "Violent crime" takes the value of 1 if individual reports either injure someone or use force to get something, and 0 otherwise. "Hard drugs" takes the value of 1 if the repondent reports consuming drugs such as cocaine and heroin since last interview, and zero otherwise. "Marijuana" takes the value of 1 if respondent reports consuming it since last interview, and zero otherwise. Coefficients presented, standard errors in paranthesis. Standard errors are clustered at the individual level. Statistical significance is denoted as *10%, **5%, and ***1% levels.

Online Appendix

Appendix Table 1: Crime participation by age and cohort, men

age:	non-criminals	any crime (violent or property)	violent criminals	property criminals	shoplift	marijuana	hard drugs	alcohol	ever been charged?
					NLSY79				
14	0.49	0.51	0.22	0.41	0.36	0.35	0.11	0.65	0.10
15	0.53	0.47	0.18	0.42	0.37	0.42	0.18	0.72	0.10
16	0.50	0.50	0.19	0.45	0.36	0.48	0.19	0.73	0.12
17	0.52	0.48	0.19	0.42	0.31	0.53	0.18	.	0.12
18	0.59	0.41	0.16	0.34	0.26	0.57	0.28	.	0.14
19	0.54	0.46	0.16	0.37	0.28	0.55	0.25	.	0.14
Total	0.53	0.47	0.18	0.41	0.33	0.49	0.20	0.70	0.12
N	2533	2533	2534	2533	2532	2534	2520	1297	2534
					NLSY97				
14	0.77	0.23	0.11	0.16	0.11	0.19	0.04	0.44	0.05
15	0.75	0.25	0.13	0.18	0.11	0.23	0.05	0.51	0.09
16	0.76	0.24	0.11	0.18	0.10	0.29	0.07	0.58	0.13
17	0.74	0.26	0.12	0.18	0.09	0.33	0.10	0.67	0.15
18	0.79	0.21	0.09	0.14	0.06	0.33	0.09	0.73	0.20
19	0.81	0.19	0.09	0.13	0.05	0.30	0.08	0.73	0.25
Total	0.77	0.23	0.11	0.17	0.09	0.28	0.07	0.61	0.14
N	8863	8863	8865	8862	8865	8865	8780	8859	8865

Note: Property criminals include individuals who either steal something or sell hard drugs. Violent criminals include individuals who either injure someone or use force to get something. "Hard drugs" takes the value of 1 if the repondent reports consuming drugs such as cocaine and heroin since last interview, and zero otherwise. "Marijuana" takes the value of 1 if respondent reports consuming it since last interview, and zero otherwise. Alcohol takes the value of 1 if repondent consumed it in the last month, is available only for those under 18 in NLSY79. "Ever been charged" corresponds to individuals who have been booked or charged for breaking a law.

Appendix Table 2: Crime participation by age and cohort, women

age	non-criminals	any crime (violent or property)	violent criminals	property criminals	shoplifting	marijuana	hard drugs	alcohol	ever been charged?
					NLSY79				
14	0.70	0.30	0.08	0.25	0.23	0.31	0.12	0.60	0.02
15	0.64	0.36	0.07	0.32	0.29	0.45	0.17	0.67	0.04
16	0.66	0.34	0.06	0.32	0.26	0.47	0.25	0.69	0.03
17	0.65	0.35	0.07	0.32	0.29	0.50	0.21	.	0.03
18	0.67	0.33	0.06	0.30	0.26	0.47	0.23	.	0.03
19	0.72	0.28	0.07	0.26	0.25	0.54	0.25	.	0.06
Total	0.67	0.33	0.07	0.30	0.26	0.46	0.21	0.66	0.04
N	2639	2639	2640	2639	2638	2640	2634	1264	2640
					NLSY97				
14	0.81	0.19	0.09	0.14	0.10	0.18	0.06	0.49	0.04
15	0.80	0.20	0.08	0.16	0.12	0.24	0.07	0.56	0.04
16	0.82	0.18	0.08	0.14	0.10	0.27	0.07	0.62	0.06
17	0.85	0.15	0.06	0.11	0.08	0.29	0.09	0.70	0.07
18	0.86	0.14	0.05	0.11	0.07	0.30	0.09	0.75	0.08
19	0.88	0.12	0.03	0.10	0.05	0.28	0.09	0.77	0.10
Total	0.83	0.17	0.06	0.13	0.09	0.27	0.08	0.65	0.06
N	8664	8664	8664	8664	8664	8664	8599	8657	8664

Note: Property criminals include individuals who either steal something or sell hard drugs. Violent criminals include individuals who either injure someone or use force to get something. "Hard drugs" takes the value of 1 if the repondent reports consuming drugs such as cocaine and heroin since last interview, and zero otherwise. "Marijuana" takes the value of 1 if respondent reports consuming it since last interview, and zero otherwise. Alcohol takes the value of 1 if repondent consumed it in the last month, is available only for those under 18 in NLSY79. "Ever been charged" corresponds to individuals who have been booked or charged for breaking a law.

Appendix Table 3: Statistical determinants of criminal participation, substance use and criminal charges, 1980 vs 2000s, OLS

	men		women		men		women		men		women	
	Violent crime (1)	Property crime (2)	Violent crime (3)	Property crime (4)	Mari-juana (5)	Hard drugs (6)	Mari-juana (7)	Hard drugs (8)	All (9)	Any crime (10)	All (11)	Any crime (12)
NLSY97, {0,1}	0.027	-0.130**	0.008	-0.054	-0.129*	-0.046	-0.133**	-0.087	0.033	-0.039	0.102***	0.174**
	(-0.051)	(-0.063)	(-0.034)	(-0.060)	(-0.067)	(-0.054)	(-0.064)	(-0.054)	(0.047)	(0.084)	(0.031)	(0.082)
South, {0,1}	0.039	-0.042	0.003	-0.067*	-0.116***	-0.017	-0.116***	-0.084**	-0.084***	-0.133***	-0.018	-0.036
	(-0.035)	(-0.043)	(-0.021)	(-0.039)	(-0.044)	(-0.038)	(-0.041)	(-0.036)	(0.031)	(0.051)	(0.016)	(0.044)
North East, {0,1}	0.013	-0.002	-0.019	0.071	-0.031	0.014	0.019	0.038	-0.070**	-0.128**	0.003	0.007
	(-0.038)	(-0.047)	(-0.022)	(-0.044)	(-0.048)	(-0.042)	(-0.047)	(-0.041)	(0.032)	(0.053)	(0.020)	(0.050)
North Central, {0,1}	0.008	-0.015	-0.007	0.036	-0.062	-0.022	-0.023	-0.025	-0.063**	-0.084*	-0.002	-0.007
	(-0.031)	(-0.040)	(-0.021)	(-0.037)	(-0.041)	(-0.035)	(-0.039)	(-0.034)	(0.029)	(0.048)	(0.016)	(0.042)
Urban, {0,1}	0.033	0.113***	0.004	-0.003	0.110***	0.063***	0.060**	0.009	0.024	-0.012	0.007	0.026
	(-0.022)	(-0.028)	(-0.015)	(-0.027)	(-0.029)	(-0.021)	(-0.029)	(-0.024)	(0.018)	(0.035)	(0.009)	(0.025)
State unempl.	0.003	0.011**	-0.002	-0.008	0.010*	0.006	-0.005	-0.001	0.000	-0.005	-0.002	-0.006
	(-0.004)	(-0.006)	(-0.003)	(-0.005)	(-0.006)	(-0.005)	(-0.006)	(-0.005)	(0.004)	(0.006)	(0.002)	(0.006)
Violent crime rate	0.000	0.000	-0.000*	-0.000***	0.000	-0.000*	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Property crime rate	0.000	0.000**	0.000	0.000***	0.000	0.000*	0.000**	0.000*	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
State police rate	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Appendix Table 3 - continued

| | men | | women | | men | | women | | men | | women | |
	Violent crime (1)	Property crime (2)	Violent crime (3)	Property crime (4)	Mari-juana (5)	Hard drugs (6)	Mari-juana (7)	Hard drugs (8)	All (9)	Any crime (10)	All (11)	Any crime (12)
South*NLSY97	-0.049	-0.017	-0.011	-0.003	0.019	-0.026	0.007	0.039	0.059	0.139**	-0.039*	-0.034
	(-0.037)	(-0.046)	(-0.024)	(-0.042)	(-0.049)	(-0.040)	(-0.047)	(-0.038)	(0.037)	(0.064)	(0.023)	(0.062)
North East*97	-0.021	0.001	0.053**	-0.061	0.030	-0.033	0.009	-0.046	0.076*	0.217***	-0.027	-0.053
	(-0.042)	(-0.053)	(-0.026)	(-0.049)	(-0.056)	(-0.045)	(-0.056)	(-0.045)	(0.041)	(0.074)	(0.028)	(0.073)
North Central*97	-0.011	-0.029	0.008	-0.082**	-0.018	-0.027	-0.072	-0.018	0.051	0.145**	-0.037	-0.040
	(-0.034)	(-0.044)	(-0.023)	(-0.041)	(-0.046)	(-0.037)	(-0.045)	(-0.037)	(0.035)	(0.063)	(0.023)	(0.062)
Urban*NLSY97	-0.050**	-0.102***	-0.025	-0.029	-0.071**	-0.048**	-0.059*	-0.026	-0.024	0.021	-0.041**	-0.109**
	(-0.025)	(-0.031)	(-0.018)	(-0.031)	(-0.034)	(-0.023)	(-0.035)	(-0.027)	(0.026)	(0.053)	(0.016)	(0.047)
State unempl.*97	-0.008	-0.019***	-0.002	-0.001	-0.013**	-0.005	-0.002	0.000	0.007	0.014	0.000	0.006
	(-0.005)	(-0.006)	(-0.003)	(-0.006)	(-0.007)	(-0.005)	(-0.007)	(-0.005)	(0.005)	(0.009)	(0.003)	(0.009)
Violent cr rate*97	0.000*	0.000	0.000**	0.000***	0.000	0.000	0.000	0.000	-0.000*	-0.000***	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Property cr rate*97	0.000	-0.000*	0.000	-0.000***	0.000	0.000	-0.000**	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
State police rate*97	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	11444	11443	11331	11330	11399	11300	11304	11233	11444	3240	11331	2211
R2	0.013	0.080	0.004	0.058	0.054	0.041	0.06	0.045	0.009	0.03	0.013	0.025

Note: Property criminals are those who steal something or sell hard drugs. Violent criminals are those who injure someone or use force to get something. "Hard drugs" takes the value of 1 if consuming drugs such as cocaine and heroin since last interview is reported, 0 otherwise. "Marijuana" takes the value of 1 if consuming since last interview is reported, 0 otherwise. Criminal charges takes the value of 1 for individuals who have been booked or charged for breaking a law, 0 otherwise. "Any crime" corresponds to property or violent crime. Coefficients presented, standard errors in paranthesis. Omitted dummy variable is Western States. Standard errors are clustered at the individual level. Statistical significance is denoted as *10%, **5%, and ***1% levels.

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Appendix Table 4: Statistical determinants of violent and property crime participation, including state gasoline lead levels, 1980 vs 2000s, OLS

	men				women			
	Violent crime		Property crime		Violent crime		Property crime	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NLSY97, {0,1}	-0.171	0.025	-0.483***	-0.596**	0.075	-0.072	-0.167	-0.342
	(0.135)	(0.240)	(0.162)	(0.294)	(0.071)	(0.154)	(0.139)	(0.268)
Gasoline lead	-0.125	-0.124	-0.217**	-0.209**	0.040	0.039	-0.088	-0.083
	(0.085)	(0.085)	(0.102)	(0.103)	(0.046)	(0.047)	(0.089)	(0.089)
Gasoline lead*97	0.126	0.130	0.251**	0.258**	-0.069	-0.043	0.026	0.048
	(0.088)	(0.088)	(0.105)	(0.107)	(0.050)	(0.051)	(0.094)	(0.096)
Urban, {0,1}	0.031	0.034	0.099***	0.104***	0.001	0.001	-0.007	-0.002
	(0.023)	(0.023)	(0.028)	(0.029)	(0.015)	(0.015)	(0.027)	(0.028)
State unempl.	0.001	-0.001	0.008	0.008	-0.001	-0.002	-0.012**	-0.012**
	(0.005)	(0.005)	(0.006)	(0.006)	(0.003)	(0.003)	(0.006)	(0.006)
Violent crime rate	0.000	-0.000*	0.000	0.000	0.000	0.000	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Property crime rate	0.000	0.000*	0.000***	0.000**	0.000	0.000	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
State police rate	0.000	0.000	0.000	0.000*	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Urban*97	-0.046*	-0.041	-0.088***	-0.091***	-0.025	-0.016	-0.020	-0.018
	(0.026)	(0.026)	(0.032)	(0.032)	(0.018)	(0.018)	(0.032)	(0.032)
State unempl.*97	-0.006	-0.005	-0.016**	-0.015**	-0.004	-0.002	0.003	0.005
	(0.005)	(0.005)	(0.007)	(0.007)	(0.004)	(0.004)	(0.006)	(0.006)
Violent cr rate*97	0.000**	0.000***	0.000	0.000	0.000*	0.000**	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Property cr rate*97	0.000	0.000	-0.000**	-0.000**	0.000	0.000	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
State police rate*97	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Black		0.002		-0.073**		0.009		-0.094***
		(0.027)		(0.031)		(0.018)		(0.028)
Hispanic		-0.059**		-0.025		-0.028		-0.019
		(0.029)		(0.036)		(0.018)		(0.033)
Solo parent		0.077***		0.073**		0.000		0.023
		(0.026)		(0.030)		(0.016)		(0.028)
Teen mother		0.055**		0.061*		0.009		0.044
		(0.028)		(0.033)		(0.018)		(0.031)
AFQT		-0.032***		-0.031**		-0.020**		-0.017
		(0.012)		(0.014)		(0.008)		(0.014)

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Appendix Table 4

	men				women			
	Violent crime		Property crime		Violent crime		Property crime	
ln (Fam inc)	0.011		-0.005		-0.012		-0.031*	
	(0.017)		(0.021)		(0.011)		(0.019)	
Parental educ	-0.004		0.009*		0.001		0.009*	
	(0.004)		(0.005)		(0.002)		(0.004)	
Enrolled in school	-0.069**		-0.066*		-0.024		-0.044	
	(0.031)		(0.038)		(0.019)		(0.033)	
HS graduate	-0.022		-0.037		0.007		0.048*	
	(0.025)		(0.031)		(0.014)		(0.028)	
Black*NLSY97	0.003		0.042		-0.004		0.047	
	(0.031)		(0.035)		(0.021)		(0.031)	
Hispanic*NLSY97	0.057*		0.023		0.012		-0.015	
	(0.032)		(0.041)		(0.022)		(0.037)	
Solo parent*NLSY97	-0.050*		-0.022		0.031*		0.019	
	(0.029)		(0.034)		(0.018)		(0.031)	
Teen mother*NLSY97	-0.067**		-0.050		0.014		-0.037	
	(0.031)		(0.037)		(0.021)		(0.035)	
AFQT*NLSY97	0.016		0.040**		0.003		0.035**	
	(0.013)		(0.016)		(0.009)		(0.015)	
ln (Fam inc)*NLSY97	-0.022		0.011		0.012		0.019	
	(0.018)		(0.022)		(0.012)		(0.020)	
Parental educ*NLSY97	0.002		-0.006		0.000		-0.004	
	(0.004)		(0.005)		(0.003)		(0.005)	
Enrolled in school*NLSY97	0.007		-0.019		-0.029		-0.003	
	(0.034)		(0.041)		(0.021)		(0.036)	
HS graduate*NLSY97	-0.014		-0.015		-0.036*		-0.066**	
	(0.029)		(0.036)		(0.018)		(0.032)	
const.	0.294**	0.257	0.651***	0.758***	0.022	0.201	0.378***	0.702***
	(0.134)	(0.230)	(0.160)	(0.282)	(0.069)	(0.144)	(0.136)	(0.252)
N	10619	10619	10618	10618	10534	10534	10533	10533
R2	0.014	0.039	0.081	0.097	0.004	0.028	0.059	0.073

Note: Property criminals include individuals who either steal something or sell hard drugs. Violent criminals include individuals who either injure someone or use force to get something. Other controls include dummy variables for age and regions, and their interactions with the NLSY97 indicators. Coefficients presented, standard errors in paranthesis. Standard errors are clustered at the individual level. Statistical significance is denoted as *10%, **5%, and ***1% levels.

Appendix Table 5: Statistical determinants of substance use, including state gasoline lead levels, 1980 vs 2000s, OLS

	men				women			
	Marijuana		Hard drugs		Marijuana		Hard drugs	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NLSY97, {0,1}	-0.536***	-0.480	-0.365***	-0.302	-0.398***	-0.593**	-0.202*	-0.884***
	(0.168)	(0.306)	(0.133)	(0.247)	(0.151)	(0.286)	(0.121)	(0.235)
Gasoline lead	-0.225**	-0.194*	-0.198**	-0.153*	-0.143	-0.112	-0.066	-0.053
	(0.106)	(0.106)	(0.084)	(0.084)	(0.096)	(0.094)	(0.078)	(0.077)
Gasoline lead*97	0.331***	0.183*	0.238***	0.149*	0.201**	0.070	0.067	0.008
	(0.111)	(0.111)	(0.086)	(0.086)	(0.102)	(0.102)	(0.080)	(0.080)
Urban, {0,1}	0.087***	0.092***	0.059***	0.068***	0.050*	0.060**	-0.005	0.015
	(0.030)	(0.030)	(0.022)	(0.022)	(0.029)	(0.029)	(0.025)	(0.025)
State unempl.	0.006	0.006	0.002	0.004	-0.007	-0.007	-0.004	-0.004
	(0.006)	(0.006)	(0.005)	(0.005)	(0.006)	(0.006)	(0.005)	(0.005)
Violent crime rate	0.000	0.000	-0.000**	-0.000*	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Property crime rate	0.000*	0.000	0.000**	0.000*	0.000**	0.000***	0.000*	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
State police rate	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Urban*97	-0.039	-0.057	-0.042*	-0.056**	-0.044	-0.065*	-0.010	-0.037
	(0.035)	(0.035)	(0.024)	(0.024)	(0.036)	(0.035)	(0.027)	(0.028)
State unempl.*97	-0.007	-0.011	0.000	-0.003	0.000	-0.001	0.003	0.003
	(0.007)	(0.007)	(0.006)	(0.006)	(0.007)	(0.007)	(0.006)	(0.006)
Violent cr rate*97	0.000	0.000	0.000*	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Property cr rate*97	0.000	0.000	-0.000**	0.000	-0.000**	-0.000**	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
State police rate*97	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Black		-0.095***		-0.126***		-0.180***		-0.164***
		(0.031)		(0.025)		(0.031)		(0.023)
Hispanic		-0.079**		-0.085***		-0.142***		-0.102***
		(0.035)		(0.027)		(0.035)		(0.029)
Solo parent		0.108***		0.045*		0.087***		0.009
		(0.031)		(0.027)		(0.029)		(0.025)
Teen mother		0.043		0.014		0.039		0.004
		(0.033)		(0.027)		(0.031)		(0.027)
AFQT		-0.020		-0.024**		-0.032**		-0.003
		(0.015)		(0.012)		(0.015)		(0.012)

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Appendix Table 5

	men				women			
	Marijuana		Hard drugs		Marijuana		Hard drugs	
ln (Fam inc)	-0.001		-0.004		-0.029		-0.064***	
	(0.021)		(0.018)		(0.019)		(0.018)	
Parental educ	0.007		0.009**		0.014***		0.007*	
	(0.005)		(0.004)		(0.005)		(0.004)	
Enrolled in school	-0.097**		-0.069*		-0.050		-0.032	
	(0.038)		(0.037)		(0.035)		(0.032)	
HS graduate	0.026		0.018		0.045		0.068***	
	(0.031)		(0.028)		(0.029)		(0.026)	
Black*NLSY97	0.081**		0.075***		0.055		0.097***	
	(0.038)		(0.026)		(0.035)		(0.025)	
Hispanic*NLSY97	0.056		0.078***		0.086**		0.085***	
	(0.042)		(0.030)		(0.042)		(0.032)	
Solo parent*NLSY97	-0.032		-0.019		0.007		0.040	
	(0.035)		(0.028)		(0.034)		(0.028)	
Teen mother*NLSY97	-0.052		-0.036		-0.036		-0.020	
	(0.039)		(0.029)		(0.037)		(0.029)	
AFQT*NLSY97	0.032*		0.025**		0.052***		0.013	
	(0.017)		(0.013)		(0.017)		(0.013)	
ln (Fam inc)*NLSY97	0.010		0.005		0.035		0.075***	
	(0.023)		(0.019)		(0.022)		(0.018)	
Parental educ*NLSY97	-0.006		-0.006		-0.009*		-0.004	
	(0.006)		(0.004)		(0.006)		(0.004)	
Enrolled in school*NLSY97	-0.010		0.012		-0.011		-0.024	
	(0.042)		(0.038)		(0.040)		(0.034)	
HS graduate*NLSY97	-0.072*		-0.037		-0.035		-0.078***	
	(0.037)		(0.031)		(0.035)		(0.030)	
const.	0.775***	0.678**	0.438***	0.401*	0.677***	0.829***	0.322***	0.930***
	(0.165)	(0.286)	(0.132)	(0.242)	(0.148)	(0.260)	(0.119)	(0.227)
N	10578	10578	10486	10486	10514	10514	10451	10451
R2	0.054	0.083	0.043	0.067	0.061	0.094	0.045	0.076

Note: "Hard drugs" takes the value of 1 if the repondent reports consuming drugs such as cocaine and heroin since last interview, and zero otherwise. "Marijuana" takes the value of 1 if respondent reports consuming it since last interview, and zero otherwise. Other controls include dummy variables for age and regions, and their interactions with the NLSY97 indicators. Coefficients presented, standard errors in paranthesis. Standard errors are clustered at the individual level. Statistical significance is denoted as *10%, **5%, and ***1% levels.

Appendix Table 6: Statistical determinants of criminal participation m
using criminal charges, including state gasoline lead levels, 1980 vs 200

	men				women		
	All		Crime participants		All		Crime pa
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
NLSY97, {0,1}	-0.112	-0.468**	-0.109	-0.635*	0.013	-0.186	0.092
	(0.110)	(0.208)	(0.193)	(0.382)	(0.059)	(0.151)	(0.180)
Gasoline lead	-0.048	-0.036	0.020	0.001	-0.046	-0.055	-0.042
	(0.068)	(0.067)	(0.121)	(0.122)	(0.036)	(0.036)	(0.103)
Gasoline lead*97	0.163**	0.036	0.144	0.012	0.070*	0.036	0.039
	(0.074)	(0.072)	(0.138)	(0.140)	(0.041)	(0.041)	(0.127)
Urban, {0,1}	0.027	0.039**	-0.004	0.028	0.003	0.010	0.017
	(0.018)	(0.018)	(0.036)	(0.037)	(0.009)	(0.009)	(0.026)
State unempl.	-0.001	-0.003	-0.005	-0.007	-0.003	-0.003	-0.006
	(0.004)	(0.004)	(0.007)	(0.007)	(0.002)	(0.002)	(0.006)
Violent crime rate	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Property crime rate	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
State police rate	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Urban*97	-0.021	-0.040	0.013	-0.027	-0.037**	-0.039**	-0.099**
	(0.026)	(0.026)	(0.055)	(0.055)	(0.017)	(0.017)	(0.049)
State unempl.*97	0.009*	0.005	0.018*	0.013	0.002	0.000	0.009
	(0.005)	(0.005)	(0.010)	(0.009)	(0.003)	(0.003)	(0.009)
Violent cr rate*97	0.000	0.000	-0.000**	-0.000**	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Property cr rate*97	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
State police rate*97	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Black		-0.055**		-0.091**		-0.035***	
		(0.022)		(0.039)		(0.011)	
Hispanic		-0.034		-0.037		0.004	
		(0.025)		(0.042)		(0.014)	
Solo parent		0.081***		0.103***		-0.003	
		(0.024)		(0.039)		(0.011)	
Teen mother		0.045*		0.066*		0.003	
		(0.023)		(0.039)		(0.012)	
AFQT		-0.023**		-0.039**		-0.003	
		(0.010)		(0.017)		(0.006)	

Continued

Appendix Table 6

	men				women			
	All		Crime participants		All		Crime participants	
ln (Fam inc)		-0.035**		-0.054**		-0.033***		-0.066***
		(0.015)		(0.026)		(0.009)		(0.021)
Parental educ		0.001		0.000		0.003*		0.004
		(0.003)		(0.006)		(0.001)		(0.004)
Enrolled in school		-0.132***		-0.108**		-0.059***		-0.099**
		(0.032)		(0.051)		(0.018)		(0.044)
HS graduate		-0.009		-0.013		-0.016		-0.033
		(0.023)		(0.038)		(0.014)		(0.035)
Black*NLSY97		0.053*		0.109*		0.007		0.042
		(0.030)		(0.056)		(0.016)		(0.045)
Hispanic*NLSY97		0.032		0.054		-0.042**		-0.056
		(0.033)		(0.060)		(0.021)		(0.057)
Solo parent*NLSY97		-0.019		-0.044		0.024		0.060
		(0.029)		(0.050)		(0.017)		(0.044)
Teen mother*NLSY97		-0.046		-0.099*		0.022		0.036
		(0.031)		(0.055)		(0.020)		(0.054)
AFQT*NLSY97		0.011		0.022		0.003		0.002
		(0.013)		(0.025)		(0.008)		(0.025)
ln (Fam inc)*NLSY97		0.038**		0.061*		0.018		0.061**
		(0.017)		(0.031)		(0.012)		(0.029)
Parental educ*NLSY97		-0.004		-0.004		-0.005*		-0.018**
		(0.004)		(0.008)		(0.003)		(0.008)
Enrolled in school*NLSY97		-0.030		-0.126**		-0.009		0.054
		(0.036)		(0.061)		(0.023)		(0.058)
HS graduate*NLSY97		-0.122***		-0.116**		-0.014		0.071
		(0.030)		(0.056)		(0.020)		(0.055)
const.	0.206*	0.656***	0.266	0.894***	0.097*	0.512***	0.159	1.000***
	(0.106)	(0.189)	(0.183)	(0.330)	(0.055)	(0.124)	(0.167)	(0.303)
N	10619	10619	3010	3010	10534	10534	2068	2068
R2	0.013	0.086	0.034	0.114	0.015	0.048	0.029	0.068

Note: Criminal charges are measured using a {0,1} variable, that takes the value of 1 for individuals who have been booked or charged for breaking a law. "Crime participants" corresponds to individuals who either steal something, sell hard drug, injure someone, or use force to get something. Other controls include dummy variables for age and regions, and their interactions with the NLSY97 indicators. Coefficients presented, standard errors in paranthesis. Standard errors are clustered at the individual level. Statistical significance is denoted as *10%, **5%, and ***1% levels.