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New Evidence on the Monetary Value of Saving a High Risk Youth

Mark A. Cohen · Alex R. Piquero

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Abstract There is growing interest in crime prevention through early youth interventions; yet, the standard United States response to the crime problem, particularly among juveniles, has been to increase the use and resource allocation allotted toward punishment and incapacitation and away from prevention and treatment. At the same time, longitudinal studies of delinquency and crime have repeatedly documented a strong link between past and future behavior and have identified a small subset of offenders who commit a large share of criminal offenses. These findings suggest that if these offenders can be identified early and correctly and provided with prevention and treatment resources early in the life course, their criminal activity may be curtailed. While researchers have studied these offenders in great detail, little attention has been paid to the costs they exert on society. This paper provides estimates of the cost of crime imposed on society by high risk youth. Our approach follows and builds upon the early framework and basic methodology developed by Cohen (J Quant Criminol 14: 5–33, 1998), by using new estimates of the costs of individual crimes, ones that are more comprehensive and that significantly increased the monetary cost per crime. We also use new estimates on the underlying offending rate for high risk juvenile offenders. We estimate the present value of saving a 14-year-old high risk juvenile from a life of crime to range from $2.6 to $5.3 million. Similarly, saving a high risk youth at birth would save society between $2.6 and $4.4 million.

Keywords Costs of crime · Criminal careers · Crime policy

Introduction

There is growing interest by both the public and policy makers in crime prevention through early youth interventions (Farrington and Welsh, 2007; Farrington et al. 2003). In a recent

M. A. Cohen (✉)
Vanderbilt Owen Graduate School of Management, Nashville, TN 37203, USA
e-mail: mark.cohen@owen.vanderbilt.edu

A. R. Piquero
Department of Criminology and Criminal Justice, University of Maryland, College Park, MD, USA

nationally representative survey, spending more public money on "prevention programs to help keep youth out of trouble" ranked higher than four other options: drug treatment programs for non-violent offenders, more police on the street, more spending on prisons, and even returning money to taxpayers (Cohen et al. 2006). A statewide study of Pennsylvania residents (Nagin et al. 2006) comparing contingent-valuation-based estimates for the public's willingness-to-pay for two distinctively different responses to serious juvenile crime (incarceration and rehabilitation) showed that the public is at least as willing to pay for rehabilitation as a response to juvenile offenders (and on average will pay more for rehabilitation than for incarceration). Nagin et al. (2006) also found that the public's willingness-to-pay for an early childhood prevention program (nurse home visitation) was substantial.

At the same time, the United States response to the crime problem, particularly among juveniles, has been to increase punishment and incapacitation and to move away from rehabilitation. In fact, resource allocation in the US to youth prevention programs is rather small, especially when compared to the resource allocation to more punitive responses (Greenwood 2006; Aos et al. 2004, 2006). Although the reasons for this are varied and include politician and policy-makers' (incorrect) assumption that the public is more punitive than not (Cullen and Gendreau 2000; Cohen et al. 2006), there has been a general lack of funding for prevention, and among those programs that do exist, many have to turn juveniles away because they are largely under-resourced.

Support for rehabilitation programs, especially early childhood prevention programs, are a key area of interest among academics and policymakers alike, largely because of the observation in longitudinal studies of crime and delinquency showing the strong relationship between prior and future behavior (Nagin and Paternoster 1991). Across multiple data sources collected at different time periods and throughout the world, a consistent finding indicates that antisocial and deviant behavior that emerges early in the life course tends to continue into childhood, adolescence, and adulthood (see Piquero et al. 2003).[1] Several of these studies have also shown that a small subset of offenders across all studies are responsible for much of the crime—especially costly property and violent crimes. And while researchers have paid close attention to this small subset of offenders, their attention has been devoted to documenting and understanding the etiology and life course of their offending. Little is known about the social costs imposed by these chronic/career offenders.

In one of the few studies on this topic, Cohen (1998) estimated the present value of external costs imposed by a typical career criminal to be $1.3–$1.5 million in 1997.[2] However, the worst offenders were estimated to impose costs as high as $36 million. Comparable estimates are $370,000–$970,000 for a heavy drug abuser and $243,000–$388,000 for a high school drop out. Combining these categories (but eliminating overlap since some drug crimes would otherwise be counted twice) resulted in an estimate of the present value of the monetary value of saving a high risk youth of $1.7–$2.3 million.

More recently, two studies attempted to estimate lifetime costs of career offenders. DeLisi and Gatling (2003) studied a combination of self-reported offending behavior and official records for 500 offenders in the US and estimated their lifetime costs to be

[1] At the same time, although most adult offenders have a prior history of juvenile offending, not all juvenile offenders become adult offenders.

[2] While we acknowledge that placing dollar values on crimes is not without controversy—especially the valuation of nonpecuniary losses associated with victimization—benefit-cost analysis is now being conducted routinely by policy analysts. For example, the State of Washington has mandated that benefit-cost analyses be conducted for "criminal justice policies, violence prevention programs, and other efforts to decrease the criminal recidivism of juvenile and adult offenders, and certain at-risk behaviors of youth" (Aos et al. 2001). Thus, it is important that existing estimates be refined and improved upon over time.

$1.14 million in 2002. While their study attempted to utilize the same costing methodology as Cohen (1998), it was also based on the number of offenses to date—and thus necessarily understated the cost of an entire criminal career. Using data from the Pittsburgh Youth Study, a longitudinal study of 500 inner-city youth aged 7–17, Welsh et al. (2008) estimated the cost of juvenile offending and found that early-onset offenders (whose first offense occurred before age 13) averaged 34.2 offenses and imposed costs of $224,000. Chronic offenders (10.2% of the sample of offenders who represent 50.1% of all offenses), imposed between $793,000 and $861,000 in 2000 dollars and committed on average 142 offenses through age 17. Neither the DeLisi and Gatling nor the Welsh et al. studies estimated the costs of a lifetime of crime, and both employed rather select samples of individuals only followed for a specific slice of the life course.

The current paper provides new estimates of the cost of a high risk youth using the same framework and basic methodology developed in Cohen (1998). Since that time, more comprehensive estimates of the costs of individual crimes have been generated that significantly increased the monetary cost per crime (Cohen et al. 2004). In addition, new estimates are now available on the underlying offending rate for high risk juvenile offenders (Farrington et al. 2003). More importantly, we utilize a longitudinal dataset of a large, urban birth cohort to examine real criminal careers.

In particular, we examine the offending behavior of all 27,186 individuals born in 1958 in Philadelphia (Tracy et al. 1990; Figlio et al. 1994; Tracy and Kempf-Leonard 1996) through 1984—about age 26. The Second Philadelphia Birth Cohort Study data (hereafter, "Philadelphia Cohort") allow us to estimate the number of crimes for each offender—not simply a generic 'average' offender—providing a better understanding of the pattern of offending and costs imposed by those with the worst criminal records. It also expands on the types of crimes we are able to include in our analysis. Whereas Cohen (1998) included murder, rape, robbery, aggravated assault, burglary, larceny and motor vehicle theft, we have been able to add the crimes of simple assault, vandalism, fraud, arson, drunk driving crashes, and other minor status offenses. We also provide year-by-year estimates of the costs imposed by high risk youth throughout their criminal careers.

The remainder of the paper closely follows the outline in Cohen (1998), and the reader is referred to that paper for more details on the underlying theory and approach. In "The Cost of Criminal Careers" section, we estimate the cost of a criminal career. "Drug Abuse" section estimates the cost of drug abuse for "heavy drug users," and "Lost Wages and Productivity" section estimates the cost of dropping out of high school. "Summary of Monetary Estimates" section summarizes and aggregates these estimates, and a final section provides some concluding remarks and suggestions for future research.

The Cost of Criminal Careers

The external costs imposed by a career criminal were enumerated in Cohen (1998), and require estimates of the length of the career, the number of crimes committed, the cost of crime to victims, criminal justice costs, and costs incurred by the offender.

The Number of Crimes Committed by Career Criminals

Cohen (1998: Table 2) estimated that the juvenile offender commits between 1–4 offenses annually from age 14–17, and the adult offender commits 10.6 crime annually for 6 years.

Thus, the total number of crimes was estimated to be about 68–80 over the offending career. This estimate was based on the 6% of boys who are "chronic juvenile offenders" that Wolfgang et al. (1972) estimated commit 50% of all offenses.

To estimate the number of crimes committed by career offenders, we first obtain actual police reported contacts from the Philadelphia Cohort data. The Philadelphia Cohort data have been widely used and are considered to be an important source of criminal career data. Only a few longitudinal studies of this type exist, and none have such a large cohort covering this length of time in a major metropolitan area of the US. Aside from the use of official records which may miss some criminal acts that go undetected, the data are likely to understate crimes due to missing offenses committed by this cohort outside the Philadelphia area, offenses past age 26, as well as missing some crimes committed by females with name changes. Piquero et al. (2003) provides more details on these data and their limitations. Interestingly, while more than 30 years has passed, the official juvenile arrest records in our data are nearly identical to recent nationwide juvenile arrest rates.[3]

Next, we need to estimate an "offense multiple" to account for the fact that only a fraction of offenses ultimately lead to police intervention and/or arrest. The offense multiples are derived from studies that compare official police records of convicted offenders to their self-reported offending behavior. Table 1 reports on our estimated offense multiples, taken from three different studies. The first set cover the juvenile period, ages 11 through 17, and are from the Seattle Social Development Youth Study (Farrington et al. 2003). These data emerge from a prospective longitudinal study of 808 youths, residing in high-crime neighborhoods in Seattle, and include both self-report and court referral information for several crime types. Self-reports contained past 12-month offending information for burglary, vehicle theft, larceny, robbery, assault, vandalism, marijuana use, and drug selling, and court referrals were collected and counted for the same eight crime types for the same reference period.

For adult offenders, we provide two different estimates.[4] The second column of offending multiples (hereinafter "M1") comes from data originally collected by Blumstein and Cohen (1979) and reported in Blumstein et al. (1986) and Cohen (1986: 300–301) on (a) a sample of all adults (18 or older) arrested in Washington, DC, during 1973 for murder, rape, robbery, aggravated assault, burglary, or auto theft ($n = 5{,}338$). Their analysis focused on cohort subsamples who turned 18 between 1963 and 1966 and whose first arrest as adults was between ages 18 and 20 ($n = 80$–200 active offenders for individual offense types), as well as (b) a sample of all adults (age 18 and older) arrested in the Detroit SMSA between 1974 and 1977 for murder, rape, robbery, aggravated assault, burglary, or auto theft ($n = 18{,}635$).

The third column of offending multiples (hereinafter "M2") comes from Rand Corporation estimates from surveys of male inmates in state prisons in California, Michigan, and Texas (Peterson and Braiker 1980; Chaiken and Chaiken 1982). The inmate

[3] To compare these two figures, we obtained annual Census data for residents under age 18 in Pennsylvania and nationwide. We then divided the number of juvenile arrests by the population to arrive at an arrest rate. In the Philadelphia cohort, there were 2.2 arrests per 100 population under age 18. At the time, this was below the U.S. average of 3.4%. In 2006, these figures have switched, so that the rate in Pennsylvania is 3.8% compared to 2.2% nationally, which is consistent with the recent spikes in crime observed in Pennsylvania generally, and Philadelphia in particular.

[4] Cohen (1998) used one offense multiple for adults based on the median reported in Blumstein et al. (1986). While the underlying studies are now quite old, we ultimately use the same sources because they are still among the best data available (see Piquero and Blumstein 2007).

Table 1 Offense multiples

	Juvenile (Farrington et al.)	Adult (Detroit and DC) "M1"	Adult (RAND) "M2"
Murder	(1)	(1)	(1)
Rape	(5.7)	(11.6)	(4.2)
Armed robbery	2.8	17.8	5.4
Robbery	2.8	17.8	5.4
Aggravated assaults	5.7	11.6	4.2
Simple assaults	5.7	11.6	4.2
Burglary	1.6	23.0	16.7
Motor vehicle theft	2.95	32.2	9.1
Larceny	5.8	35.7	50.0
Drunk driving crash[a]	(1)	(1)	(1)
Arson	(5.7)	(11.6)	(4.2)
Vandalism	4.1	(11.6)	(4.2)
Fraud	(5.8)	(35.7)	(50)
Other (drunk driving, prostitution, etc.)	(5.8)	30.0	(50)

Note: Numbers in parentheses are estimated based on similar or the lowest categories. See text for sources

[a] Drunk driving cases are considered "other" unless the police report noted a victim—in which case it was considered an actual crash

samples were restricted to offenders whose current offense or prior criminal record are serious enough to have warranted incarceration, with inmates' self-reported frequency estimates based on their self-reports of counts of crimes they committed in an observation period preceding the current incarceration (Blumstein et al. 1986: 56).

Table 2 reports on the number of offenders and offenses in the Philadelphia Cohort data through 1984, about age 26. Of the 27,160 individuals born in 1958 in Philadelphia, 6,157 (23%) recorded at least one police contact, with the average being 3.2 per offender. Applying the offense multiples from Table 1, we estimate the average individual with at least one police contact commits between 41.1 and 47.8 offenses.[5] We show comparable figures for those with 2 or more police contacts, 3 or more, etc. and also the 5% and 1% of offenders with the most police contacts or offenses. For example, the 95th percentile offender has 11 contacts and between 156 and 186 offenses, while the 99th percentile offender has 20 police contacts and between 304 and 369 offenses.

As shown in Table 2, we find in the Philadelphia Cohort data that about 4% of the population (16% of offenders) represent 51% of all police contacts (and between 49% and 51% of total offenses), and use that as the average benchmark for our criminal career.[6] The average number of police contacts for these offenders is 10.5 through age 26. However, these 10.5 police contacts represent an estimated 134.4–150.4 actual offenses.

Table 3 displays offending behavior by age. Actual police contacts peak at age 16 with 1.54 offenses per offender. Offending behavior is estimated to peak at age 18, between 20.2 and 22.4 offenses. Throughout this paper, we use the Farrington et al. multiples for juveniles and then provide two estimates for adult multiples (see Table 1).

[5] Note that some of the juvenile police contacts in the Philadelphia Cohort data do not ultimately result in an arrest. While we have counted incidents as "contacts," we have not increased these incidents by using an offense multiple.

[6] The 966 offenders with 6 or more police contacts represent 3.6% of the 27,160 individuals in the cohort. Of the 14,000 females, only 30 (0.2%) had 6 or more police contacts, while 7.1% (930 out of 13,160) of males were in this category.

Table 2 Number of police contacts and estimated number of offenses. Philadelphia Cohort—through age 26[a]

	Number of offenders	Number of contacts	Number of offenses (M1[b])	Number of offenses (M2[b])	Percent of population	Percent of offenders	Percent of contacts	Percent of offenses (M1)	Percent of offenses (M2)
One or more contacts	6,157	3.2	41.1	47.8	23	100	100	100	100
2+ contacts	3,330	5.1	65.5	75.3	12	54	86	86	85
3+ contacts	2,208	6.7	85.4	97.2	8	36	75	75	73
4+ contacts	1,612	8.1	103.2	116.7	6	26	66	66	64
5+ contacts	1,240	9.3	119.0	133.6	5	20	59	59	56
6+ contacts	966	10.5	134.4	150.4	4	16	51	51	49
10+ contacts	425	14.7	184.3	204.6	2	7	32	32	30
15+ contacts	155	20.2	233.2	253.3	1	3	16	16	13
95%	308	11	156.4	186.1	1	5	17	17	19
99%	62	20	304.0	369.0	0.2	1	6	6	8

[a] Age 26 cohort only measured for six months on average. See text

[b] Juvenile offenses are estimated using Farrington et al. multiples; adult offenses are estimated using either M1 or M2. See text

Table 3 Number of police contacts and offenses by Age. Philadelphia Cohort data (offenders with 6+ police contacts)

	Contacts	Offenses (M1[a])	Offenses (M2[a])
Through age 8	0.06	0.1	0.1
Age 9	0.07	0.2	0.2
Age 10	0.07	0.2	0.2
Age 11	0.18	0.6	0.6
Age 12	0.35	1.1	1.1
Age 13	0.52	1.6	1.6
Age 14	0.70	2.4	2.4
Age 15	1.19	4.4	4.4
Age 16	1.54	6.7	6.7
Age 17	1.21	5.5	5.5
Age 18	0.82	20.2	22.4
Age 19	0.68	16.2	18.0
Age 20	0.55	13.3	14.7
Age 21	0.57	13.9	16.3
Age 22	0.58	14.1	17.0
Age 23	0.55	13.2	15.6
Age 24	0.42	10.1	11.8
Age 25	0.31	7.4	8.3
Age 26[b]	0.13	3.1	3.4
Total	10.50	134.4	150.4

[a] Juvenile offenses are estimated using Farrington et al. multiples; adult offenses are estimated using either M1 or M2. See text

[b] Age 26 cohort only measured for six months on average. See text

Table 4 breaks these offenses down by type of crime. The average "high risk" juvenile offender has 5.9 police contacts through age 17, and an estimated 22.9 offenses. The most common juvenile offenses are motor vehicle theft (5.2), drug violations (3.8), and robbery (2.2). As adults through age 26, these individuals have 4.6 police contacts on average, and 111.5–127.5 total offenses. The three most common adult offenses are theft (34.3–48.0), drug violations (16.6–27.6), and burglary (12.8–17.6).

Costs of Individual Crimes

As shown above, Cohen (1998) estimated three components of crime costs—victim costs, criminal justice costs (police, courts, and prisons), and lost productivity of offenders who are incarcerated. The methodology used to estimate crime costs was taken from Miller et al. (1996)—a "bottom up" approach that ignores important components of the costs of crime—including "fear of crime," actions or expenditures taken by the public to avoid the risk of crime, as well as any residual loss to the community in terms of social cohesion, community development, etc. (Nagin 2001). More recently, Cohen et al. (2004) utilized a "top down" approach to estimate the public's willingness-to-pay ("WTP") to reduce crime (see Nagin et al. 2006 and Cohen 2005 and 2008 for a discussion of these different approaches). While we believe the WTP approach is more appropriate and comprehensive, the "bottom up" approach also provides useful information on some of the components of costs. Thus, while we ultimately adopt the WTP estimates in this paper, we provide estimates using both approaches.

Table 4 Number of police contacts and offenses by type of crime. Philadelphia Cohort data (age 8 through 26[a]) (offenders with 6+ police contacts)

	Juvenile contacts	Adult contacts	Combined contacts	Juvenile offenses	Adult offenses (M1)	Adult offenses (M2)	All offenses combined (M1[b])	All offenses combined (M2[b])
Murder	0.03	0.04	0.07	0.03	0.04	0.04	0.07	0.07
Rape	0.1	0.1	0.2	0.4	1.2	0.4	1.6	0.9
Armed robbery	0.1	0.2	0.3	0.3	3.2	1.0	3.5	1.3
Robbery	0.8	0.6	1.4	2.2	10.8	3.3	12.9	5.4
Aggravated assault	0.3	0.5	0.9	1.8	6.0	2.2	7.8	4.0
Burglary	1.1	0.8	1.9	1.7	17.6	12.8	19.3	14.5
Theft	1.0	1.0	2.0	5.2	34.3	48.0	39.5	53.3
MV theft	0.4	0.01	0.4	1.2	0.2	0.07	1.4	1.3
Simple assault	0.4	0.2	0.6	1.7	2.5	0.9	4.2	2.6
Arson	0.03	0.002	0.03	0.1	0.02	0.009	0.2	0.1
Fraud	0.01	0.04	0.05	0.04	1.6	2.2	1.6	2.3
Prostitution	0.01	0.11	0.12	0.05	3.4	5.7	3.5	5.8
Vandalism	0.4	0.005	0.4	1.1	0.1	0.02	1.1	1.1
Weapons	0.3	0.15	0.4	1.3	4.4	7.4	5.7	8.7
Drugs	0.3	0.6	0.9	3.8	16.6	27.6	20.4	31.4
Gambling	0.004	0.05	0.05	0.014	1.5	2.5	1.5	2.5
Drunk driving crash	0	0	0.03	0	0.03	0.03	0.03	0.03
Alcohol violation	0.2	0.009	0.2	0.5	0.3	0.5	0.8	1.0
Loitering	0.02	0.007	0.03	0.07	0.2	0.4	0.3	0.4
Other	0.4	0.2	0.6	1.3	7.5	12.5	8.8	13.8
Total Crimes	5.9	4.6	10.5	22.9	111.5	127.5	134.4	150.4

[a] Age 26 cohort only measured for six months on average. See text

[b] Juvenile offenses are estimated using Farrington et al. multiples; adult offenses are estimated using either M1 or M2. See text

The next sections identify these individual costs using a "bottom up" approach, which is then followed by a section that provides alternative estimates using a "top down" approach that is based on the public's WTP to reduce crime.

Victim Costs

Miller et al. (1996) estimate victim costs for various crime categories. However, a few adjustments need to be made in order to estimate the costs required in this study. First, those estimates include a category for "police/fire services," which need to be subtracted out from victim costs in order not to double count with criminal justice costs which would include most of that category. Second, some adjustments needed to be made to yield

Table 5 Estimated "bottom up" and WTP for crimes (2007 dollars)

	Victim costs	CJ costs	Offender productivity	Total	WTP estimate
Murder	$4.6		million	$300,000	$140,000
$5.0 million	$11.8		million		
Rape	$135,000	$8,300	$4,500	$150,000	$290,000
Armed robbery	$29,000	$14,700	$8,000	$50,000	$280,000
Robbery	$12,000	$7,400	$4,000	$23,000	$39,000
Aggravated assaults	$37,000	$13,500	$6,400	$55,000	$85,000
Simple assaults	$4,500	$5,000	$1,300	$11,000	$19,000
Burglary	$2,000	$2,300	$1,000	$5,000	$35,000
Motor vehicle theft	$5,500	$2,900	$1,000	$9,000	$17,000
Larceny	$450	$1,700	$700	$2,800	$4,000
Drunk driving crash	$28,000	$1,700	$700	$30,000	$60,000
Arson	$57,000	$1,700	$700	$60,000	$115,000
Vandalism	$370	$630	–	$1,000	$2,000
Fraud	$1,100	$1,700	$700	$3,500	$5,500
Other offenses (prostitution, loitering, false statements, etc.)	–	$500	–	$500	$1,000

comparable definitions of assaults.[7] Third, costs were updated to 2007.[8] The first column of Table 5 displays these updated victim cost estimates. In addition, we have added new estimates of the victim costs of vandalism and fraud based on the Philadelphia Cohort data. The average reported property damage due to vandalism was $370 in 2007 dollars, while the reported loss due to fraud was $1,100 in 2007 dollars.[9]

Criminal Justice-Related Costs Due to Career Criminals

We follow Cohen (1998) by estimating the likelihood that an offender who has been arrested will be convicted, sentenced to probation versus prison, as well as the costs of each

[7] For simple assaults, Miller et al. (1996) included a category of assault with "no injury," which was valued at $1,860 in 1993 dollars, and a category titled "NCVS with injury" valued at $24,000. Unfortunately, the definition of "simple assault," which is how the Philadelphia Cohort data are coded, includes minor injuries. Thus, neither estimate is perfect. According to the most recent NCVS data, 76% of simple assaults result in no injury. If we assume that simple assaults with "minor injury" are about 25% as serious as the average assault with injury, those simple assaults would cost $6,000 ($24,000/4). Based on the ratio of simple assaults with injury versus no injury, this implies an average cost of approximately $2,900—or $4,495 in 2007 dollars (Criminal Victimization in the United States, 2005, Table 91—Percent distribution of victimizations, by type of crime and whether or not reported to the police. Available at: http://www.ojp.usdoj.gov/bjs/pub/pdf/cvus/current/cv0591.pdf).

[8] To convert 1993–2007 dollars, we have taken the ratio of the average hourly wage rate in the US from US Census data, resulting in a multiple of 1.55.

[9] The Philadelphia Cohort data contain 19 frauds committed by juveniles where victim costs were estimated. The estimated average victim cost for those juvenile frauds was $110, in addition to 74 adult frauds with an average cost of $515. Updated to 2007 dollars, the weighted average cost was $1,100. There were also 724 recorded cases of juvenile vandalism with monetary estimates averaging $74, and an additional 8 adult offenses averaging $79. Updated to 2007 dollars, these offenses average $370.

stage of the criminal justice process. These estimates come from the same sources as before—primarily BJS.[10]

Opportunity Cost of Career Criminal's Time While Incarcerated

Using a similar methodology as Cohen (1998), we estimate legitimate earnings by inmates prior to incarceration to be $12,660 annually in 2002 (BJS 2004b), or $14,626 in 2007 dollars. It is not clear why this is significantly higher than the $7,542 estimated in 1997 dollars in Cohen. However, the earlier estimate was based on 1978 inmate surveys, while the current one is based on 1997 data. It appears that a slightly higher percent of the more recent sample had wage income (63.2% vs. 60%).

While this section had been titled "Foregone Earnings of Career Criminals" in Cohen (1998), the term 'W' was actually defined as the "opportunity cost of the offender's time," and it was noted that "legitimate wages" were used as a measure of the opportunity cost. We have changed the title here to account for the fact that there are other potential costs associated with an offender's time in prison—including costs borne by his or her family as well as physical or mental harm suffered by the offender while in prison.[11] This is perhaps the least studied area of the cost of crime—and also one that is quite controversial. Should the offender's utility be included in the calculation of the costs of imprisonment? After all, one of the reasons we incarcerate offenders is to deter others from committing crimes—so imposing disutility on offenders might be considered something that is a social good. On the other hand, it is also true that if we were faced with two options that had identical crime reduction benefits and otherwise cost the same amount of money—the one that imposed the least disutility on offenders would be preferred. Abrams and Rohlfs (2007) provide the first evidence of offender's valuation of their freedom. By examining the decision of defendants to post bail, they find that the average defendant foregoes $949 in wages for 90 days and has an implied "value of freedom" of $1,050 for the same time period. Thus, at least in this one sample of defendants, foregone earnings are a reasonable proxy for the value of lost freedom.

Perhaps more important is the cost to the family of offenders. On the one hand, growing up with an incarcerated parent might have a negative effect on a child's upbringing. On the other hand, since many offenders are also alcohol or drug abusers it is possible that taking the parent out of the home has a positive effect. Unfortunately, we lack good data on this—and further studies are needed.[12]

Of course, if one wants to seriously consider the intergenerational transfer of criminality and other social ills, it might be appropriate to also consider the fact that children whose parents are career criminals are likely to be at high risk of becoming criminals themselves—independent of any potential effect of incarceration. Thus, one potential cost of a career criminal might be the intergenerational transfer of crime. While this topic has been

[10] Estimates of time served were taken from BJS (2006a, b, 2007). The average daily cost of prison was estimated to be $62.01 in 2001 (BJS 2004a), or $72.65 in 2007 dollars using the consumer price index.

[11] Researchers have recently begun to consider both the economic and non-economic costs on a community or neighborhood's well-being when an individual is incarcerated. While these costs have not been included here, conceptually, one could consider adding them as well.

[12] One exception is Lengyel (2006), who attempts to estimate the social costs of imprisoning a drug offender who is the parent of young children in New York state. Lengyel explicitly accounts for lost quality of life to the incarcerated offender and his/her family, in addition to other costs such as child care. He also attempts to control for the offsetting benefits to some spouses and/or children who are made better off by removing the offender from the family situation.

studied (Widom 1989), it has not yet made its way into serious efforts to "cost" a criminal career.

Willingness-to-Pay for Reduced Crime

While conceptually, one could use a "bottom up" approach to piece together all of the costs of crime, in practice, researchers have yet to fully account for all cost components. For example, no estimates have been made of the monetary value of fear of crime, social degradation, or avoidance behavior by potential victims (for recent attempts to fill some of these gaps, see Dolan et al. (2005) and Moore (2006)). While Anderson (1999) attempted to estimate some of these costs, his methodology does not allow for the costing of individual crimes or of a criminal career. In contrast, the "top down" WTP approach to estimating the costs of crime reduces this concern as individuals are asked to assess their value of reduced crime—regardless of what the cost components are. This method has been used by others to study crime costs (Ludwig and Cook 2001) and has recently been adopted in cost-benefit analyses (Nagin et al. 2006; Donohue 2007). Thus, we adopt the more recent WTP estimates from Cohen et al. (2004).

Cohen et al. (2004) did not include all crime types. One way to expand their list of crimes is to estimate the relationship between the "bottom up" and "top down" approaches. This approach was used in Cohen (2008) and Donohue (2007). However, one of the unknowns about the Cohen et al. methodology is exactly what components of crime costs respondents included in their valuation. The survey questions do not provide details on what would likely happen in the event crime is reduced—it only asks respondents to value a 10% reduction in crime. Presumably, this would include the respondent's valuation of fear, expected costs of victimization, as well as any anticipated reduction in personal expenditures or avoidance behaviors. However, Donohue (2007) argues it is unlikely to include the criminal justice or offender productivity savings. Thus, he adds these components to the Cohen et al. (2004) costs to arrive at a total "social cost" of crime. Cohen (2008) does not take that approach, and assumes these estimates are all encompassing. Until future contingent valuation studies probe respondents on these questions, we do not know whether to add these categories or not. Luckily, they are an extremely small portion of the total costs once we use the Cohen et al. (2004) estimates. For example, Donohue (2007: Table 5) shows that 91.5–97.9% of his combined costs of crime are accounted for using the Cohen et al. estimates alone. In this paper, we assume the WTP estimates are all encompassing. However, since we are showing these components separately, the reader could choose to add them on to the WTP estimates.

Table 5 provides updated 2007 dollar estimates of the cost of individual crimes using the bottom up approach from Miller et al. (1996), and the WTP approach from Cohen et al. (2004). Details of the assumptions and calculations are available from the authors.

For example, as shown in Table 5, the total victim costs associated with a murder are estimated to be $4.6 million (including lost productivity, pain, suffering and lost quality of life, etc.). Each murder (after controlling for the likelihood of detecting and punishing the offender) results in an estimated $300,000 in criminal justice costs and $140,000 in offender productivity losses. Thus, the total "bottom up" estimate of the cost of murder is $5.0 million. Alternatively, based on the Cohen et al. (2004) WTP study, the cost of murder is estimated to be $11.8 million.

The Present Value of a Lifetime of Crime

Table 6 reports on the present value of total costs imposed by a career criminal through about age 26.[13] Present values have been calculated as of age 8 at a 2% discount rate. The first column reports average costs for offenders who have only one police contact through age 26. The cost of the single police contact offense for those who have only one police contact through age 26 ranges from $39,620 (based on a bottom up cost method) to $90,268 (based on WTP). Since not all offenses result in police contacts, the total costs imposed by those who only have one police contact are estimated to be higher—ranging from $63,784 to $241,950—depending upon which multiple and cost estimation method is used. Note that there are 2,827 individuals with only one police contact. Thus, they represent about 10% of the entire cohort and 46% of all offenders.

The second column of Table 6 reports the average costs imposed by offenders who have had two or more police contacts—representing 12.3% of the Philadelphia cohort population, and 54.1% of the offender population. If we only look at the cost imposed by police contacts (ignoring any multiples), the present value ranges from $201,527 based on the "bottom up" approach and $473,039 based on WTP. The next two rows show comparable figures for the bottom up approach, using the estimated multiples. This increases the cost to between $378,593 and $532,553. The final two rows use the WTP estimates, resulting in costs ranging between $1,074,124 and $1,627,736. As shown in Table 6, the worst offenders impose much higher costs. Those with 15 or more police contacts, for example, impose costs between $3.6 and $5.8 million dollars using the WTP approach. These offenders represent 0.6% of the Philadelphia cohort and 2.5% of the offender population. Although not shown in Table 6, the costs are even higher if we look at the 99th percentile of the offender population—with total WTP costs ranging From $10.3 to $10.4 million.

Cohen estimated the present value of a career criminal to range from $1.3 to $1.5 million in 1997 dollars - equivalent to about $1.8–$2.1 million in 2007. In Cohen, the career criminal was estimated to have committed between 1 and 4 crimes per year for 4 years as a juvenile, and 10.6 crimes per year over the course of 6 years as an adult—between 68 and 80 crimes overall. Cohen also indicated these individuals represent about 6% of all boys, and account for about 50% of all crimes. This cohort would be equivalent to the fifth column of Table 6 (offenders with 6 or more contacts). On average, they commit between 134.4 and 150.4 crimes through age 26[14]—about 10.5 of which involve police contact. The present value for these offenders using the "bottom up" approach is estimated to range between $800,000 and $1.0 million—about half the amount in Cohen once converted to 2007 dollars. However, the present value of WTP estimates range from $2.3 and $3.5 million—considerably higher. Thus, using comparable "unit costs" of crime and controlling for inflation, the monetary value of saving a high risk youth has actually gone down. However, using the higher WTP estimates, the monetary value of saving a high risk youth has increased.

While it is difficult to compare the Cohen estimates to those reported here, it appears that the most significant difference accounting for the reduction in total costs (when using comparable "unit costs" of crime) is the fact that we estimate fewer aggravated assaults than before. Cohen assumed a total of 19.1–22.5 aggravated assaults over the criminal career—compared to

[13] As noted elsewhere in the text, these data only include about half of the crimes committed by 26 year olds. Later, in Table 8, we estimate crimes past that age.

[14] This represents about twice the number of crimes as estimated in Cohen (1998). Of course, we include many minor crimes that were not included in Cohen. Limiting our crimes to those covered in Cohen, we estimate about 80–86 offenses (very close to the 68–80 offenses estimated in Cohen).

Table 6 Present value of cost of a career criminal by number of police contacts Philadelphia Cohort (from age 8 through 26[a]) (2007 dollars)

	1 contact	2+ contacts	3+ contacts	4+ contacts	5+ contacts	6+ contacts	10+ contacts	15+ contacts
PV "bottom up" costs—contacts only	$39,620	$201,527	$275,102	$291,731	$345,526	$412,579	$492,951	$480,503
PV WTP—contacts only	$90,268	$473,039	$648,385	$688,927	$818,517	$978,193	$1,176,666	$1,168,169
PV "bottom up" costs—offenses (multiple 2)[b]	$63,784	$378,593	$513,399	$581,682	$680,939	$793,468	$1,030,926	$1,179,109
PV "bottom up" costs—offenses (multiple 1)[b]	$87,626	$532,553	$717,387	$823,853	$961,362	$1,108,196	$1,455,258	$1,710,457
PV WTP—offenses (multiple 2)[b]	$173,140	$1,074,124	$1,456,357	$1,680,672	$1,980,304	$2,308,447	$3,051,238	$3,649,350
PV WTP—offenses (multiple 1)[b]	$241,950	$1,627,736	$2,204,516	$2,585,596	$3,048,512	$3,523,193	$4,739,861	$5,815,344

Note: Discount rate 2% calculated from age 8. All figures updated to 2007 dollars

[a] Age 26 cohort only measured for six months on average. See text

[b] Juvenile offenses are estimated using Farrington et al. multiples; adult offenses are estimated using either M1 or M2. See text

Table 7 Willingness-to-pay costs by type of crime through age 26[a]. Philadelphia Cohort data (offenders with 6+ police contacts)

	WTP juvenile only	WTP combined (M1[b])	WTP combined (M2[b])	Percent of total costs (M1[b])	Percent of total costs (M2[b])
Murder	$354,244	$855,072	$855,072	19	29
Rape	$24,917	$464,961	$247,251	10	9
Armed robbery	$31,594	$990,841	$361,855	22	12
Robbery	$30,441	$504,408	$212,045	11	7
Aggravated assault	$28,861	$662,674	$337,756	15	12
Burglary	38,043	$675,964	$507,279	15	17
Theft	$4,054	$158,071	$213,021	4	7
MV theft	$7,004	$24,114	$21,268	0.5	0.7
Simple assault	$7,769	$79,767	$49,347	2	2
Arson	$2,976	$17,488	$15,726	0.4	0.5
Fraud	$46	$8,950	$12,451	0.2	0.4
Prostitution	$9	$3,501	$5,799	0.1	0.2
Vandalism	$406	$1,111	$1,073	0.0	0.0
Weapons	$257	$5,746	$8,707	0.1	0.3
Drugs	$311	$20,381	$31,416	0.5	1
Gambling	$4	$1,505	$2,499	0.0	0.1
Drunk driving crash	$–	$2,050	$2,050	0.0	0.1
Alcohol violation	$184	$822	$1,008	0.0	0.0
Loitering	$20	$292	$437	0.0	0.0
Other	$395	$8,804	$13,794	0.2	0.5
Total crimes	$531,536	$4,486,520	$2,899,853	100	100

Note: All costs are shown in 2007 dollars and are not discounted to present value

[a] Age 26 cohort only measured for six months on average. See text

[b] Juvenile offenses are estimated using Farrington et al. multiples; adult offenses are estimated using either M1 or M2. See text

4.0–7.8 as shown in Table 4. Aggravated assaults accounted for nearly 45% of the total crime costs in Cohen, compared to only about 15% of crime costs in this study (see Table 7).

The reason unit costs of crime using the WTP approach are significantly higher than the unit costs assumed in Cohen is that the latter is based primarily on victim and criminal justice costs—and excludes any provision for fear of crime and community-level social degradation associated with crime. The WTP approach includes these costs and is thus more comprehensive.[15]

[15] Note that unit cost of crime estimates have increased substantially over time (even after adjusting for inflation) - primarily due to improved estimation methodologies—not due to any underlying change in the severity of crime-related injuries. The earliest estimates by Cohen (circa 1988) were based on jury awards to accident victims—adjusted for the distribution of injuries for crime victims. That method understated the intangible costs since, a broken leg, for example, caused by an accident was given equal value to a broken leg caused by mugging. This was clearly a lower bound estimate as we know that there is added fear and anguish associated with an intentional injury that would not be captured by estimates based on accidental injuries. Miller et al. (1996) overcame this limitation by obtaining jury award data on actual crime victims—which was particularly helpful in valuing rape. It also improved upon the victim survey-based medical cost estimates from BJS that Cohen (1988) used by going directly to hospital data to obtain better estimates of the true cost of intentionally caused injuries (Victims are seldom aware of the full hospital costs or long-term costs of their injuries).

Table 8 Year-by-year costs imposed by "high risk offenders". Philadelphia Cohort data (offenders with 6+ police contacts)

	$WTP (M1)[a]	$WTP (M2)[a]
Through Age 8	$2,482	$2,482
Age 9	$2,741	$2,741
Age 10	$3,010	$3,010
Age 11	$24,316	$24,316
Age 12	$32,669	$32,669
Age 13	$69,199	$69,199
Age 14	$97,397	$97,397
Age 15	$143,448	$143,448
Age 16	$279,371	$279,371
Age 17	$306,732	$306,732
Age 18	$552,613	$314,286
Age 19	$506,358	$273,543
Age 20	$366,024	$191,235
Age 21	$419,557	$216,942
Age 22	$492,415	$296,495
Age 23	$458,017	$250,562
Age 24	$369,075	$205,531
Age 25	$255,362	$132,125
Age 26 (half year)	$106,844	$55,730
Subtotal	$4,487,631	$2,897,813
Estimated Age 26[b]	$106,844	$55,730
Estimated Age 27	$293,162	$113,032
Estimated Age 28	$257,367	$74,771
Estimated Age 29	$215,725	$31,650
Estimated Age 30	$168,237	–
Estimated Age 31	$114,901	–
Estimated Age 32	$55,718	–
Total	$5,699,586	$3,172,998

Note: All costs are shown in 2007 dollars and are not discounted to present value. Numbers may not add due to rounding

[a] Juvenile offenses are estimated using Farrington et al. multiples; adult offenses are estimated using either M1 or M2. See text

[b] Estimated based on half year of data. See text

Table 8 compares total WTP costs each year for high risk offenders. For offenders who ultimately have 6+ police contacts through age 26, costs imposed in the early ages (through age 10) are relatively low—about $3,000 at age 10. Much like aggregate age/crime curves, costs peak at age 18—estimated to range between $314,286 and $552,613. Through age 26, total costs are estimated to range between $2.9 and $4.5 million. Since the Philadelphia Cohort data include all births in 1958 but only include crimes committed through December 1984, individuals born in mid-1958, for example, will only have turned 26.5 by December 1984. To estimate all crimes committed by 26 year-olds, we examined the monthly distribution of births and monthly distribution of adult crimes in the Philadelphia Cohort data (to account for seasonality). We estimate that about 50.6% of crimes were committed by 26 year-old cohorts during 1985. Thus, we have doubled the actual crime rate for the age 26 cohort. To estimate offending data past age 26, we estimated quadratic regression models for both M1 and M2 with total costs being the dependent variable and age (and age-squared) being the independent variables. The adjusted R^2 on these two regressions ranged from 0.70 to 0.72. Using predicted values from these regressions, we estimate additional losses through age 32 for the M1 multiple crime

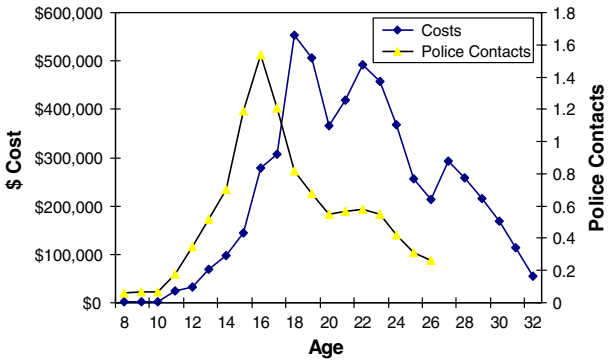

Fig. 1 WTP crime costs and police contacts by age

estimate, and age 29 for M2—increasing total lifetime costs to between $3.2 and $5.7 million. While costs from age 26 onward are extrapolated and thus subject to further error, we note that costs based solely on the Philadelphia Cohort data before extrapolation account for 78.7% of total costs using M1 and 91.3% using M2.

Figure 1 compares the age-profile of police contacts—which peaks at ages 15–17 and drops sharply by age 18, to WTP costs (based on M1)—which peaks at ages 18–24. The reason for this difference is that juvenile offenders are more likely to have police contacts for minor non-index crimes, which account for about 76% of all juvenile contacts compared to only 68% of adult contacts. In addition (as shown in Table 1), the multiples for adult offenders are estimated to be considerably higher than for juveniles.

Table 9 presents these data in a way that provides insights into the value of "saving" a high risk youth at each age. For example, if a high risk offender can be identified at age 8, when they have only imposed $2,482 in costs, the present value of future costs saved are $4.3 million. By age 18, a total of $1.5 million in costs will already have been imposed; yet the present value of future costs not yet imposed are still high—$3.7 million. Even at age 26, after imposing $4.6 million in costs, the present value of future costs expected to be imposed are $1.0 million.

Table 9 Cumulative crime costs and present value of future crime costs imposed by high risk youth who ultimately has 6+ police contacts throughout their life, by age[a]

Age	Costs that year	Costs to date	Present value of costs in future
8	$2,482	$2,482	$4,348,769
10	$3,010	$8,233	$4,518,654
12	$32,669	$65,218	$4,643,736
14	$97,397	$231,814	$4,663,363
16	$279,371	$654,633	$4,426,075
18	$552,613	$1,513,978	$3,739,409
20	$366,024	$2,386,360	$3,007,972
22	$492,415	$3,298,332	$2,209,130
24	$369,075	$4,125,424	$1,462,127
26	$213,688	$4,594,474	$1,047,040
28	$257,367	$5,145,003	$532,948
30	$168,237	$5,528,965	$166,202
32	$55,718	$5,699,584	$0

[a] Juvenile offenses are estimated using Farrington et al. multiples; adult offenses are estimated using M1. See text

Drug Abuse

This section estimates the external costs imposed by high risk youth who at some point in their career become heavy drug abusers. Drug abuse imposes costs on users through lost productivity, possible physical or psychological illness and resultant medical costs, drug treatment costs, etc. Oftentimes these costs are born by the user's families or society at large. In addition to the value of the drugs they purchase—which contributes to a drug market resulting in lost productivity to those engaged in drug sales instead of legitimate employment, heavy drug users often support their habits by property crimes or robberies. The model estimated in Cohen for the lifetime cost imposed by a drug user compiles each of these cost components to arrive at an estimate of the external costs imposed by a lifetime of drug abuse. Estimates of the lifetime costs of drug abuse can assist in conducting cost-benefit of drug prevention and treatment programs. To do so, however, first requires an estimate of the number of heavy drug abusers.

The Number of Heavy Drug Users

In 2006, 20.4 million Americans age 12 or older (8.3% of that age group) reportedly used illicit drugs during the past month (SAMHSA 2007a: 16)—an increase from the 5.5% reported in Cohen. An estimated 7.8 million (38.2%) of users are in need of treatment (SAMHSA 2007a: 81). Among the most problematic drug users are 2.4 million who reported having used cocaine in the last month, 700,000 crack users, 730,000 methamphetamine users, and 340,000 heroin users—a total of 3.5 million (ignoring duplication). In Cohen (1998), this base estimate was 2.5 million.

To estimate the "retention rate" among users, using the same methodology in Cohen (1998), we obtained data from National Survey on Drug Use and Health, 2005, on past month usage by age.[16] Based on the estimated retention probabilities, this results in approximately 13.5 years of heavy drug use.[17]

Opportunity Cost of Resources Associated with the Manufacture and Sale of Drugs

According to the most recent study (ONDCP 2000: 3), annual spending on illicit drugs declined over the 1990s, and by 2000 was approximately $63 billion (compared to a high of $116 billion in 1998). ONDCP (2000: 13) estimated median hardcore cocaine users in the US spent $186 per week, while hardcore heroin users spent $209, and methamphetamine users spent $90. On an annual basis, these figures are $9,672 for cocaine users, $10,868 for heroin, and $4,680 for methamphetamine. These figures are about identical for cocaine users reported in Cohen based on 1990 expenditures, and lower than estimates at the time for heroin users—which reflects the fact that heroin prices have come down over time. More recent DEA data suggest drug prices are no higher in 2007; hence, we use 2000

[16] The survey data are available from ICPSR at: http://www.icpsr.umich.edu/cocoon/ICPSR/STUDY/04596.xml.

[17] We calculated the number of past month drug users for cocaine, crack, and heroin from age 19 onward, who reported their original use of that drug occurred prior to age 19. By comparing the fraction of age 20 users who began their drug use prior to age 19, for example, to the fraction of age 19 users who also began their drug use prior to age 19, we can estimate a retention percentage by each age group. Using these data, we estimated a quadratic regression equation by age category to obtain year-by-year retention estimates. To arrive at annual estimates for heavy drug abusers, we start at age 14 and continue through age 41 (the last year in which the regression model predicts positive usage for those who begin prior to age 19).

prices. Based on the proportion of heavy drug users by type of drug, we thus estimate that the typical "heavy drug user" spends about $9,500 annually on drug purchases in 2007 dollars.[18] This represents about $44.5 billion annually.

The estimate of $9,500 can be combined with the "retention rate" to determine the expected lifetime value of purchases by a typical heavy drug user, approximately $128,000 or $110,000 in present value terms as of the time the youth becomes a heavy drug user. Discounting to present value as of birth reduces this to $73,000; and $102,000 as of age 10.[19] This is a significant drop from the estimate of $336,000 ($252,000 in present value terms) in Cohen (1998), reflecting a combination of lower prices and shorter career length. Following Cohen, we reduce this figure by 50–75% to account for the opportunity cost of resources devoted to drug distribution, since the price includes a substantial risk premium. Thus, lifetime costs are estimated to be $32,000–$64,000, or $27,500–$55,000 in present value as of age 14 or 18. As of birth, present value costs range from $18,250 to $36,500; and as of age 10 from $25,500 to $51,000.

Drug Rehabilitation Expenses

Due to data availability, only federal government spending on drug treatment was included in Cohen (1998). Since then, SAMHSA (2007b: 44) estimated 2003 expenditures from all sources (including state, local, insurance, and private sources) to be $10.2 billion—including $2.966 billion at the federal level. Ten years later, ONDCP (2007) reported that the federal government spent $2.93 billion on drug treatment in 2007—about the same as 2003. Thus, we use the 2003 figure of $10.2 billion as the base for 2007. Using a similar methodology as Cohen, we divide this by the number of drug users "in need of treatment" (7.8 million) to arrive at an estimated cost per user of $1,300 in 2007. Converting this into a lifetime total (based on the retention rates estimates above) yields a cost of $17,500, or $15,000 when discounted at a 2% rate at either age 14 or 18, $14,000 at age 10, and $10,000 at birth.

Reduced Productivity Due to Decreased Work Ability

ONDCP (2004: IV-4) estimated the productivity loss due to drug abusers who are hospitalized or suffer from drug abuse-related illness totaled $58 billion in 2002. Using the growth in average wages in the US between 2002 and 2007, this would be approximately $67.4 billion. Of the 20.4 million Americans who reported using drugs in the past month, 17.9 million of them are over age 17 (SAMHSA 2007a: 19). If we divide this 17.9 million into the $67.4 billion productivity loss, this amounts to $3,750 per drug user. This is conservative as we are unable to separate out the presumably higher cost for heavy drug abusers from the "average" drug abuser who has a positive productivity loss. Over the course of a drug career, this amounts to $50,000. In present value terms, this is equal to $29,000 at birth, $40,000 at age 10, and $43,500 at age 14 or 18.[20]

[18] This figure is obtained by taking the weighted average of 3.325 million hardcore cocaine users at $9,672 per year; 977,000 heroin users at $10,868; and 350,000 methamphetamine users at $4,680.

[19] Since heavy drug use can start at various ages, and since we are providing estimates based on age 14 and 18 throughout this paper, the present value of drug abuse cost estimates are identical for ages 14 and age 18. When we discount from age 10 or birth, we assume that drug abuse begins at age 14.

[20] Note that Cohen cited previous research suggesting that there was only a small (if not insignificant) demonstrated relationship between drug use and productivity. However, more recent evidence has refined this by showing that there is a significant reduction in productivity among the chronic (as opposed to the casual) drug abuser (see French et al. 2001; Alexandre and French 2004).

Medical Costs Associated with Overdose or Other Drug-Related Illness

Using the same methodology as Cohen over the estimated 13.5 years of heavy drug abuse, medical costs associated with drug overdoses, as well as drug-caused tuberculosis, HIV/AIDS, and Hepatitis B and C totals approximately $20,000. These data are taken from ONDCP (2004: IV-3).[21] Discounted to present value at birth, this is $11,500; $16,000 at age 10; and $17,500 at ages 14 or 18.

Premature Death Due to Drug Abuse

ONDCP (2004: Table B-10) estimates there were 20,928 premature deaths in 2000 due to drug abuse (excluding those caused by homicide which would be included elsewhere herein). They report the present value of future productivity loss for the average premature death to be $1.05 million based on the weighted average age/sex earnings profile. Converting this to a 2% discount rate (used in this paper, as opposed to the 3% used by ONDCP) and updating to 2007 dollars, this would be the equivalent of $1.56 million in present value terms (or $2.4 million undiscounted). Based on the estimated 3.5 million heavy drug users, the annual risk of death is 0.6%, for a lifetime risk of about 8%. Cohen cited another study suggesting a lifetime risk as high as 14%. In this paper, we have estimated losses ranging from a low of 8% lifetime risk to a high of 14%. Thus, the average cost of premature death for a heavy drug user is estimated to range from $190,000 to $330,000. In present value terms, this is equivalent to $90,000–$160,000 at birth, $100,000–$175,000 at age 10, or $125,000–$220,000 at 14 or 18.

Additional Crime Committed by Drug Users

Miller et al. (2006) estimated the total cost of "drug-attributable" crime to be $37.5 billion in 1999—the equivalent of about $58 billion in 2007 dollars. This estimate is based on the "bottom up" costing methodology of Miller et al. (1996), which had estimated total costs of crime to be $450 billion in 1993. Updated to 1999 dollars, this would be $550 billion. Hence, drug-attributable crime accounts for about 6.8% of all crime costs committed in the US. Using the WTP estimates to value these crimes yields a total of $211 billion in 2007 dollars. Divided over the estimated 3.5 million heavy drug abusers, the annual cost of crimes attributable to drug abuse would range between $16,500 and $60,000 per drug abuser. Over their drug abuse career, these costs total $220,000–$800,000. Discounted to present value from birth, they range from $125,000 to $460,000; from age 10, $175,000 to $640,000; from age 14 or 18, $190,000 to $700,000. Since our final estimates are based on WTP, we use the upper end of these ranges in our summary tables.

[21] ONDCP (2004: IV-3) estimated the cost of hospital and ambulatory care for acute drug-related illness was $1.454 billion in 2002. Additional costs for special diseases associated with drug use were estimated to be $19 million for Tuberculosis, $3.755 billion for HIV/AIDS, and $312 million for Hepatitis B and C. Health insurance administration costs were estimated to be an additional 7.6% on top of these expenses. Combined, medical care costs are estimated to be $5.96 billion, or $7.3 billion inflated to 2007 dollars using the medical care cost component of the CPI. Assuming that 75% of these costs are due to heavy drug abusers, this amounts to $1,500 per person annually (75% × $7.3 billion/3.5 million heavy drug users).

Table 10 The lifetime costs imposed by a heavy drug user (2007 dollars)[a]

	Total costs	Present value (age 14 or 18)	Present value (age 10)	Present value (birth)
Resources devoted to drug market	$32,000–$64,000	$27,500–$55,000	$25,500–$51,000	$18,250–$36,500
Drug treatment	$17,500	$15,000	$14,000	$10,000
Reduced productivity	$50,000	$43,500	$40,000	$29,000
Medical costs	$20,000	$17,500	$16,000	$11,500
Premature death	$190,000–$330,000	$125,000–$220,000	$100,000–$175,000	$90,000–$160,000
Drug-defined crime (CJ costs)	$36,000	$20,000	$28,000	$31,000
Additional crime	$800,000	$700,000	$640,000	$460,000
Total	$1,150,000–$1,300,000	$950,000–$1,100,000	$865,000–$965,000	$650,000–$740,000

[a] Numbers may not add due to rounding

Criminal Justice Costs Associated with Drug Use

The FBI (2007) estimates there were 1,889,000 drug related arrests in the US in 2006. Using the same methodology as Cohen, we assume 25% of these arrests were heavy drug abusers. Thus, we estimate about 475,000 drug arrests annually among the population of 3.5 million heavy drug abusers—about 13.6% of the heavy drug abuser population annually. Taking into account the cost of arrest, probability of conviction, time served, etc., criminal justice related costs per arrested drug offender are $19,500. Thus, annual costs per heavy drug abuser are estimated to be $2,650 (13.6% × $19,500). Over the drug abuse career, this totals $36,000. At birth, the present value of drug-related criminal justice costs total $20,000; $28,000 at age 10; and $31,000 at ages 14 or 18.

Third-Party Costs (e.g., Crack Babies, Malnourished, Neglected, or Mistreated Children)

ONDCP (2004: IV-3) estimated the cost of illness for drug-exposed children to be $605 million in 2002. Increasing this by 7.6% to account for administrative costs and 22.5% for medical care inflation, this is approximately $740 million in 2007. Dividing by 3.5 million heavy drug abusers, results in an average cost of $210—or about $400 per female drug abuser. Over the 13.5 years of a drug career, this amounts to $2,800, or $5,500 for female drug abusers. Due to the small number relative to other costs, and the fact that so few of our high risk youth population are female, we have not included them in the summary tables.

The Present Value of a Heavy Drug Abuser

Table 10 summarizes the lifetime costs imposed by a heavy drug abuser—with total costs estimated to range between $1.15 and $1.3 million. Discounted to present value at ages 14 or 18, costs are estimated to range between $950,000 and $1.1 million. These estimates are

Table 11 Lifetime costs of dropping out of high school (2007 dollars)[a]

	Total costs	Present value (age 18)	Present value (age 14)	Present value (age 10)	Present value (birth)
Lost wage productivity	$450,000	$280,000	$250,000	$240,000	$200,000
Fringe benefits	$115,000	$70,000	$65,000	$60,000	$50,000
Nonmarket losses	$115,000–$450,000	$70,000–$280,000	$65,000–$250,000	$60,000–$240,000	$50,000–$200,000
Total	$675,000–$1.0 million	$420,000–$630,000	$390,000–$580,000	$360,000–$540,000	$300,000–$450,000

[a] Numbers may not add due to rounding

very comparable to those in Cohen (1998) once updated for inflation.[22] The largest cost category is crime attributable to drug abuse, which makes up 60–70% of these costs. The second largest category is the lost productivity associated with premature death of drug abusers—about 15–25% of total costs.

Lost Wages and Productivity

As discussed in Cohen (1998) the benefits of a high school education include higher wages and productivity, as well as additional private and public (external) benefits, including enhanced enjoyment of leisure activities, non-market productivity, improved child development and nurturing, health status, social cohesion, charitable giving, etc.

According to US Census Bureau data, average earnings in 2006 for a high school graduate or GED who worked full-time year round was $37,303, compared to $28,881 for the average individual with a 9th through 12th grade education but no degree. This differential varies by age and is highest during peak earning years of 40–49. Those who graduate from high school are also in the labor force longer. Worklife expectancy for an 18-year-old high school educated male is 37.97 years compared to 33.38 years for a high school drop out (Skoog and Ciecka 2001). For females, corresponding worklife estimates are 32.62 and 26.64. Thus, on average, high school drop outs work 30.0 years, compared to 35.3 years for high school graduates. Over an entire worklife, high school graduates earn an additional $450,000, or $280,000 discounted at 2% from age 18; $250,000 measured at age 14; $240,000 at age 10 and $200,000 at birth. In addition, employer-paid fringe benefits are estimated to add 25.8% to these figures.[23] Following Cohen, the private returns from a high school education are increased from 25% to 100% to account for additional non-wage public and private benefits.

Table 11 summarizes the lifetime costs of dropping out of high school, which are estimated to range between $675,000 and $1.0 million—virtually identical to the amount estimated in Cohen (1998) once updated for inflation. Discounted to present value as of age

[22] The largest difference is due to an estimated increase in drug-attributable crime. While we estimate this to be $700,000, Cohen (1998) estimated a range of $220,000–$606,000. The lower end of that range was based primarily on a one year study of offenders who underwent drug treatment—a selected sample.

[23] Bureau of Labor Statistics, "Employer Costs for Employee Compensation—June 2007," September 20, 2007, http://www.bls.gov/news.release/ecec.t01.htm. Total wages, paid leave and supplemental pay was $22.05 per hour for all workers, while benefits totaled $5.70 per hour, or 25.8%.

Table 12 Summary of the monetary value of saving a high risk youth (2007 dollars)[a]

	Total costs (not discounted)	Present value (age 18)	Present value (age 14)	Present value (age 10)	Present value (birth)
Career criminal	$3.2–$5.7 million	$2.0–$4.3 million	$2.7–$4.8 million	$2.6–$4.6 million	$2.1–$3.7 million
Heavy drug use	$1.15–$1.3 million	$840,000–$1,100,000	$840,000–$1,100,000	$865,000–$965,000	$650,000–$740,000
Dropping out of high school	$675,000–$1.0 million	$420,000–$630,000	$390,000–$580,000	$360,000–$540,000	$300,000–$450,000
Less duplication	($800,000)	($700,000)	($700,000)	($640,000)	($460,000)
Total	$4.2–$7.2 million	$2.6–$5.3 million	$3.2–$5.8 million	$3.2–$5.5 million	$2.6–$4.4 million

[a] Numbers may not add due to rounding

18, the total costs range from $420,000 to $630,000. Additional estimates are provided as of birth ($300,000–$450,000), age 10 ($360,000–$540,000) and age 14 ($390,000–$580,000).

Summary of Monetary Estimates

Table 12 summarizes the estimates in this paper. The present value of saving a high-risk youth is estimated to be $2.6–$5.3 million at age 18. These figures have been adjusted to account for the fact that the three categories (crime, drugs, and high school dropout) are not mutually exclusive, as heavy drug abusers might also be career criminals. Costs are higher at ages 10 ($3.2 and $5.5 million) and 14 ($3.2 and $5.8 million) since criminal offending and drug abuse generally begins earlier in those that pursue a lifetime of crime (Loeber and Farrington 1998; Farrington 2003). Discounted to birth, the present value of saving a high-risk youth is estimated to range from $2.6 to $4.4 million.

Concluding Remarks

This study provides new estimates of the monetary value of saving a high risk youth, updating and expanding on Cohen (1998). In addition to using new estimates of the cost of crime and expanding on the number of crimes, the paper utilizes actual police contact data from the 1958 Philadelphia Birth Cohort study which provides rich longitudinal data to compare costs at various ages and offending rates. Several key findings emerged.

First, the typical "high risk" youth with 6+ police contacts (who collectively commit about 50% of all crimes), imposes between $4.2 and $7.2 million in costs. Discounted to present value at age 14, costs total $3.2–$5.8 million. The bulk of these costs ($2.7 million–$4.8 million) are due to crimes, while an additional $390,000–$580,000 is estimated to be the value of lost productivity due to dropping out of high school. The cost of a heavy drug abuser is estimated to range between $840,000 and $1.1 million, although $700,000 of that amount is the cost of crime committed by heavy drug abusers (and hence already included in the crime cost estimates).

Second, we provide estimates of the value of saving a high risk youth at various ages. For example, programs targeting first-time juvenile offenders can utilize estimates based

on age 14—$3.2–$5.8 million. However, other programs target early childhood—from high risk mothers and their newborn children through early childhood education (see Greenwood 2006). Discounted to present value at birth, the monetary value of saving a high risk youth is estimated to range between $2.6 and $4.4 million.

Third, one of our most important findings is that while juvenile offending behavior accounts for a small fraction of total costs, if those juveniles can be prevented from becoming career criminals, savings may be enormous. For example, the typical career criminal imposes $65,000 in costs through age 12 and $230,000 through age 14 (see Table 8). However, throughout a lifetime, these costs total nearly $5.7 million. Thus, early interventions targeting high risk youth can have high payoffs *if* they are effective.

Fourth, our findings highlight the tremendous value that could be gained by targeting high risk offenders. For example, the present value of costs imposed by someone with only one police contact in their lifetime ranges from $173,000 to $242,000 (see Table 7). However, an offender with 2+ police contacts imposed $1.1–$1.6 million through age 26. The worst offenders, i.e., those who have 15+ police contacts, impose costs that are estimated to range between $3.6 and $5.8 million through age 26.

While the state of the art in costing a criminal career has evolved considerably over the past decade, further research needs exist. At the top of any list would be a more thorough understanding of the intergenerational transfer of crime. To the extent high risk youth ultimately become parents whose children follow their career paths, our estimates understate the full lifetime costs of crime. Related to this is the need for further research on the effect (and resultant costs) of punishment on offenders and their families—including lost freedom for the incarcerated offender, child development concerns for children with incarcerated parents, and lifetime earning capacity (Piquero and Blumstein 2007). More research on these topics would assist policy makers in understanding the trade-offs between various punishment and rehabilitation strategies.[24] Finally, replication of our work with other longitudinal data sources, including an array of offenders, locales, and crime types, is warranted in an effort to provide comparability to our estimates.

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