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The Monetary Value of Saving a High-Risk Youth

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Programs targeted at high-risk youth are designed to prevent high-school dropout, crime, drug abuse, and other forms of delinquency. Even if shown to be successful in reducing one or more social ill, a key policy question is whether the cost to society from that intervention program exceeds its benefits. Although the costs of intervention programs are often available, the benefits are more illusive. This paper provides estimates of the *potential* benefits from "saving" a high-risk youth, by estimating the lifetime costs associated with the typical career criminal, drug abuser, and high-school dropout. In the absence of controlled experimental data on the number of career criminals averted, one can ask the reverse question—How many career criminals must be prevented before the program "pays for itself?" Based on a 2% discount rate, the typical career criminal causes $1.3–$1.5 million in external costs; a heavy drug user, $370,000 to $970,000; and a high-school dropout, $243,000 to $388,000. Eliminating duplication between crimes committed by individuals who are both heavy drug users and career criminals results in an overall estimate of the "monetary value of saving a high-risk youth" of $1.7 to $2.3 million.

KEY WORDS: high-risk youth; cost-benefit analysis; prevention programs; career criminals; heavy drug users; high-school dropouts.

INTRODUCTION

Programs targeting high-risk youth are designed to prevent high-school dropout, crime, drug abuse, and other forms of delinquency. Even if an intervention program is successful in reducing one or more social ill, a key policy question is whether or not its cost to society exceed its benefit. In some instances, policymakers might need to choose between two alternative programs. Suppose that at a cost of $1 million, one could either fund a program expected to save 4 youths from becoming career criminals or incarcerate 40 more youths. Which alternative should be chosen? To answer such questions, information is needed about both costs and benefits. Although

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costs of prevention and punishment are often available, monetary benefits are more illusive.

In an ideal situation, a cost–benefit analysis of an intervention program would track participants and a group of matched controls from the time of the intervention throughout their lifetime. Barnett (1993) compared the costs and benefits of the Perry Preschool Study, a pre-school intervention program that included a control group whose participants have been followed periodically through age 27. Such an ideal situation will seldom present itself in most intervention evaluations.

Absent of such long-term controlled experimental data, this paper sets forth a new framework and provides some preliminary estimates of the *potential* benefits from intervention programs designed to assist high-risk youth. We estimate the costs imposed by the career criminal, the typical heavy drug abuser, and the high-school dropout. In the absence of hard data on the number of actual crimes averted, one can ask a different question—How many career criminals must be prevented before the program "pays for itself?" or How many more "successes" must intervention A have before it is preferable to intervention B?

Section 2 discusses the theoretical basis for this paper. The cost of a criminal career is estimated in Section 3, a heavy drug user in Section 4, and a high-school dropout in Section 5. A concluding section examines the policy implications and limitations of this research.

2. THE COSTS OF ANTISOCIAL BEHAVIOR: A UNIFYING FRAMEWORK

This section briefly sets forth the theoretical framework underlying the empirical analysis that follows. In short, this paper estimates the *present discounted value* of the *external marginal* costs imposed by a career criminal, heavy drug abuser, and high-school dropout.

2.1. External Costs Versus Social Costs

Antisocial behavior can be characterized as an "externality"—an action taken by one person that negatively affects another person in society, where that person does not voluntarily accept this negative consequence (through monetary payments or otherwise). "Social cost" is a closely related but not identical concept. For example, the "external" costs associated with a violent armed robbery include stolen property, medical costs, lost wages, and pain and suffering endured by the victim. The victim neither asked for nor voluntarily accepted compensation for enduring these losses. Most of these external

costs are also social costs. Lost wages are roughly equal to the lost productivity to society. Medical expenses are resources that could have been spent elsewhere in the economy, providing a socially productive activity. Although pain and suffering costs are not actual commodities or services exchanged in the marketplace, individuals are willing to pay real dollars and expend real resources to avoid the pain, suffering, and lost quality of life associated with becoming a crime victim. To the extent that society cares about the well-being of crime victims, these costs should be considered both external and social costs of the victimization.

Some economists have argued that stolen property is an "external" but not a "social" cost, since the offender can enjoy the use of the property or sell it to a fencing operation. This example highlights the fact that "social cost" is a normative concept based on the analyst's subjective evaluation of whether or not an activity is socially harmful. Thus, some economists argue that stolen property *is* a social cost because society has determined that the victim has a right to the property that the offender does not possess. For our purposes, we consider these losses as "external costs" and ignore the debate about whether or not they are social costs. The key question for our purpose is whether or not external harm is caused.

In addition to the costs of violent crime, this paper also considers drug abuse and lack of education to be external costs. Although the "victimless" crime of drug abuse is not by itself an externality if the user voluntarily purchases drugs and reaps the full benefits and costs associated with its use, drug abuse imposes many external costs: drug users might be less productive in the workforce and might commit crimes to support their drug habits, dealers might forgo socially productive work activities, and society might be burdened with additional medical costs in treating drug addicts. Similarly, although high-school dropouts might incur the private costs associated with a lower lifetime of income, society loses out from a decrease in labor productivity and perhaps from higher medical expenses due to having a less healthy lifestyle.

2.2. Tangible Versus Intangible Costs

Although most of the cost categories associated with high-risk youth are tangible losses such as labor productivity or medical expenses, a significant portion of the cost of crime is associated with the "intangible" costs of pain, suffering, and lost quality of life (Cohen, 1988). These intangible costs can be monetized using various techniques developed by economists over the past 20 years that have become widely accepted for cost–benefit analysis. In the case of fatalities, the statistical value of an additional year of life can be inferred from consumer behavior in buying life-saving products and from

worker willingness to accept riskier jobs in exchange for a premium wage (Viscusi 1993). Value of life estimates are widely used in cost–benefit studies published in the academic literature and prepared for government agency regulatory analysis.[2]

In the case of *nonfatal* injuries, we have adopted a jury award analysis method that is being increasingly used in policy analysis. Jury awards exhibit identifiable patterns that can be distilled from a large sample of cases through regression analysis that controls for factors such as the involvement of the plaintiff, deep pocket of the defendant, etc. Nonfatal injuries have been estimated using jury award analysis for crime victims (Cohen, 1988) and consumer product injuries (Rogers, 1993). Indeed, the Consumer Product Safety Comission uses the jury award methodology in estimating pain and suffering for purposes of regulatory analysis of consumer product injuries (see, e.g., Zamula, 1987).

Although pain, suffering, and lost quality of life to crime victims is included, we exclude losses incurred directly by drug users or incarcerated offenders. These are private costs borne by the person who consumes the drugs or commits the crime. To the extent that individuals can anticipate the consequences of their actions, these effects are entirely "internalized" in their decision to commit a crime or use drugs. Unlike the private medical costs incurred by drug abusers, "pain and suffering" is not a resource that could be put to more productive uses.

2.3. Average Versus Marginal Costs

This paper estimates "marginal" costs imposed by the typical high-risk youth, not "average" costs. Marginal costs exclude such important costs as fear of crime, private security expenditures, and "averting" behavior such as taking cabs instead of walking or changing one's lifestyle due to the risk of victimization. We exclude these costs since they are not affected by any one criminal's actions. If an intervention program is designed to attack a large enough percentage of the population of high-risk youth, it might ultimately affect some of these larger social problems. Thus, on a larger scale, the aggregate benefits of programs designed to reduce crime might exceed the sum of the benefits of individual programs.[3] This distinction is important, as many of the costs of crime and drug abuse are of this more aggregate

[2]Indeed, the Office of Management and Budget requires regulatory agencies to apply these monetary estimates in regulatory analyses to estimate the number of lives saved.

[3]On the other hand, it may not be possible to replicate a small pilot intervention program on a scale large enough to make a significant dent in aggregate crime rates. Replication may not be possible if the success of a program can partly be explained by the high level of commitment and intensity of interest by initial program participants, for example.

nature. Earlier papers that have attempted to identify all of the cost categories associated with these social ills include those by Cohen *et al.* (1994) for crime, French *et al.* (1991) for drug abuse, and Haveman and Wolf (1984) for education.

2.4. Discounting Costs to Present Value

Investing in a program that prevents a high-risk youth from embarking on a life of crime involves expenditures today but might yield benefits over a 15- to 20-year time span or more. Since a dollar spent today is not the same as a dollar received 15 years from now, future benefits must be discounted to present value when compared to the costs borne today. We adopt a commonly used rate of 2% per year, which is consistent with the "real" (i.e., net of inflation) discount rate for worker wages over time and the real consumer interest rate over time (Lesser and Zerbe, 1994). It is also close to the net discount rate often used by economists in estimating present value of lost earnings in court proceedings for personal injury and wrongful death compensation.

For the purposes of this paper, it is assumed that the prevention program under consideration targets high-risk youth up to age 13. Benefits are assumed to accrue from age 14 onward, as a youth is saved from becoming a "typical" juvenile delinquent and/or high-school dropout beween age 14 and age 17 and a career criminal or drug abuser from age 18 on. Discounting of benefits thus begins from age 14 onward.

3. CRIMINAL CAREERS

This section estimates the lifetime costs imposed by a career criminal. The target population for our study is the "chronic juvenile offender" whom we assume will continue his life of crime as an adult. Blumstein *et al.* (1986) estimate that about 6% of all boys account for more than half of all arrests. If an individual embarks on a criminal career, he is likely to engage in a variety of crimes over a period of years and also runs the risk of being arrested, convicted, and incarcerated. Thus, the external costs imposed by a criminal career are

$$\text{Lifetime cost} = \sum_{ij} (1-\beta)^{j-1} \lambda_{ij} [\text{VC}_i + \text{CJ}_i + \text{CI} * T_i + W * T_i]$$

where

λ = mean number of offenses
VC = victim cost of crime
CJ = cost of criminal justice investigation, arrest, adjudication

CI = cost of incarceration (days)
T = average time served (days)
β = discount rate
W = opportunity cost of offender's time
i = crime 1 through crime I
j = year 1 through year J of crime.

Inside the brackets are four terms: VC_i (average cost to victims for each type of crime), CJ_i (average criminal justice cost per crime), CI $*$ T_i (average cost of incarceration per crime), and $W * T_i$ (opportunity cost of incarceration as measured by a convicted offender's legitimate wages). Each of these terms is multiplied by λ_{ij}, the number of offenses committed by a career criminal each year. The resulting annual cost can be converted into a lifetime cost by adding average annual costs, discounted to present value by the social discount rate β. Each of these terms is considered below. Table I summarizes the key variables in this paper, including a brief assessment of the degree of uncertainty and possible alternative sources for estimating these parameters.

3.1. The Number of Crimes Committed by Career Criminals, λ

Blumstein *et al.* (1986, p. 66) estimate that the annual rate of committing crime (λ) for active offenders ranges from 2 to 4 per year for serious assaults and 5 to 10 per year combined for robbery and property crimes. Larceny and motor vehicle theft are committed at roughly twice the rate of robbery and burglary. The estimates shown in Table II use the midpoint of these ranges. There do not appear to be any estimates for the crimes of rape and murder, which presumably are much less frequent than the above crime rates for the average population of criminals. Since each of the other offenses involve a risk of death to the victim, murder has been incorporated into the analysis by including it as a "risk component" of each of the other crimes (see Cohen, 1988). For example, the risk of death to a robbery victim is less than 0.2%. All murders that are not specifically the result of a rape or robbery are included in the aggravated assault category.

Blumstein *et al.* (1986, p. 92) provide estimates of the average length of an adult criminal career, which range from 5 to 15 years. However, they conclude that the typical 18-year old who begins his criminal career will average 5.6 years as a career criminal. For the purposes of this paper, the typical adult crime career is assumed to last 6 years.

The data on juvenile offenders appear to be less solid than those for adult offenders. Estimates in this paper are based on a range of one to four crimes per year from age 14 to age 17. The distribution of crimes is assumed to be the same as that for adult criminal careers. The low end of the range

is based on actual juvenile convictions, while the upper end is based on self-reported rates of offending (Loeber and Snyder, 1990, p. 102; Nagin *et al.*, 1995).

3.2. Victim Cost of Crimes Committed by Career Criminals, VC_i

The largest single component of crime costs is the loss endured directly by victims, VC_i. Although some crime victims suffer direct financial losses, in many instances, pain and suffering far outweighs any monetary loss. For example, the cost of the average robbery includes $2700 in tangible losses and $6700 in pain, suffering, and lost quality of life. Using a "value of statistical life" of $3.4 million (Miller *et al.*, 1996, Table 2; updated to 1997 dollars), the monetary value of the risk of death to a robbery victim is approximately $6200. Table II illustrates how the estimated cost per crime can be combined with λ to arrive at an estimated $165,000 in victim costs imposed per year of a criminal's career. About 35% of that amount ($58,000) is attributable to tangible costs such as lost wages and medical bills, while the remaining 65% ($107,000) is an estimate of the monetary value of lost quality of life to victims. Assuming that the distribution of juvenile crimes is the same as that for adults, the annual victim cost ranges (based on one to four crimes per year) from $15,000 to $62,000 for crimes committed by juveniles.

3.3. Criminal Justice-Related Costs Due to Career Criminals, $CJ_i + CI * T_i$

Cohen *et al.* (1994) estimate the cost per offense of criminal justice system costs (CJ_i) and of punishment costs ($CI * T_i$). The same procedure has been used here (updating to 1997 dollars and adding property crimes) to estimate total criminal justice costs associated with career criminals. It is based on the probability of an offender ending up at each stage of the criminal justice system, multiplied by criminal justice costs for each stage. The dollar estimates per incident are shown in Table III, where it is estimated that the average career criminal annually adds $40,000 to the cost of the criminal justice system.[4] On average, the career criminal is estimated to spend nearly 8 years in jail or prison in addition to 6 years of time on the street committing crimes. Obviously, these are only average estimates, since some career criminals are seldom if ever caught or incarcerated, while others may spend 15–20+ years in prison.

[4]Cohen (1995, Table III) gives more detail on these calculations. A similar result (using a different methodology) was reported by Kleiman *et al.* (1988, Table X).

Table I. Key Assumptions and Variables Used in Analysis

Variable	Estimates in paper	Explanation and sources	Notes/limitations/other estimates
Crime			
λ, median number of offenses per year	*Juvenile*: Range 1–4 per year, same distribution as adult *Adult*: 3 assaults, 1.25 robbery, 1.25 burglary, 2.5 larcenies, 2.5 MV thefts, 0.1 rape	*Juvenile*: Low end of range is average number of convictions, high end is average number based on self-reports (Loeber & Snyder, 1990) *Adult*: Midpoint of the ranges estimated by Blumstein *et al.* (1986). Consistent with medians reported by Canela-Cacho *et al.* (1997), Murders are incorporated into each crime category based on risk of death in respective crime. No estimates of rape are available; arbitrarily assumed 1/10 per year per career criminal	*Juvenile*: Thornberry *et al.* (1995, pp. 219–220) find 3.9 offenses per year for nonchronic violent offenders (3/4 of juvenile offenders) and 33.6 offenses for chronic violent offenders (1/4 of juvenile offenders) *Adult*: Mean λ's are 5–10 times higher than medians. The most serious offenders (90th percentile) have mean λ's that are 5–20 times higher than the means for all offenders (Canela-Cacho *et al.* 1997). Intensive drug use increases λ and early arrest is associated with higher λ (Blumstein & Petersilia, 1995, p. 473)
Length of criminal career	*Juvenile*: 4 years (age 14–17). *Adult*: 6 years from age 18 on	*Juvenile*: Based on juveniles who become adult offenders *Adult*: Blumstein *et al.* (1986) estimate mean career length is 5.6 years	*Adult*: Ranges from 5 to 15 years (Blumstein *et al.*, 1986). Note: According to Blumstein & Petersilia (1995, p. 473), career length has not been adequately studied
Victim costs	See Table II	Miller *et al.* (1996). Includes intangible costs such as pain, suffering & lost quality of life	Note: Intangible costs make up approximately 50% of the total lifetime costs of a career criminal
Criminal justice system	See Table III. Typical career spends 8 years in jail & prison	Cohen *et al.* (1994). Based on probability of offender entering each stage of process & its cost	Might vary for individual offenders, depending on their probability of being apprehended and differences in sentencing behavior
Forgone earnings of criminal	$7542 per year of incarceration	Cohen *et al.* (1994, p. 136), updated to 1997 dollars	Based on prison surveys reported by BJS and adjusted by Cohen *et al.*

Drug abuse			
Population of drug users	Heavy drug users	ONDCP (1991, pp. 23-25). Heavy drug users account for about 25% of current users. An additional 25% are estimated to be in need of treatment, while 50% are minor/ occasional users	Available data most closely resemble heavy drug users, but sometimes include others in need of treatment. Estimates may be too low for heavy drug users and too high for drug users in need of treatment. Number of heavy drug users might be too low due to difficulty in identifying this population in national surveys (Wright *et al.*, 1995)
Retention rate and length of drug career	Assumed to begin at age 15 and decline beginning at age 22. "Retention rate" is 67% by age 26-29, 51.1% by age 30-34, 6.8% by age 50+. Assumed career over by age 60. Total expected years = 14	Harrison and Gfroerer (1992, p. 432) report the percentage of each age group who are heavy drug users. A regression line was estimated, where the dependent variable is the percentage of users at age 25 who continue to use drugs and the independent variable is age	Assumes no new "entry" during this age profile and that the rate of usage is stable over time, so that our estimate of the percentage in each age bracket who used cocaine in 1991 would continue throughout the coming decades. Based on heavy drug users only. Excludes pattern of most casual users
Cost of drugs	$15,000 per year of heavy drug use (updated to 1997 dollars)	ONDCP (1991, pp. 23-25). Based on $9000-$10,000 per "heavy cocaine user" in 1990, and $17,000 per heroin addict, and the ratio of cocaine to heroin users	Current and future drug prices depend heavily on U.S. government drug enforcement policies and other external factors
	Reduced by 50-75% to account for risk premium due to drug trade	Reuter *et al.* (1990)	Reuter *et al.* (1990) estimates drug dealer compensation of $30/h compared to $7.50 in legitimate activities. Only study available on risk premium for drug dealers. Aside from drug-related crime, this is the largest component of costs & the least solid
Drug treatment	$314/drug user in need of treatment per year	US DOJ (1992, p. 133)	Not based on treatment needs. Assumes treatment is evenly split between heavy drug users and drug users in need of treatment

Table I. Continued.

Variable	Estimates in paper	Explanation and sources	Notes/limitations/other estimates
Reduced productivity for drug users in workplace	Age 18 24, $119/yr Age 25 34, $833/yr Age 35 54, $4336/yr Losses applied only to years in which drug use occurs (taking into account "retention rate")	Rice *et al.* (1990)	French *et al.* (1996) conclude there is little relationship between drug abuse and productivity. However, this excludes heavy drug users or dealers who have left the legitimate labor force. Lifetime costs due to productivity loss are less than 5% of costs
Medical costs	$475/yr of heavy drug use (1997 dollars)	US DOJ (1992, p. 132) estimates $906 million spent on illness where primary diagnosis was drug abuse and $190 million on drug-related AIDS cases. Assumed that 75% of these costs are for heavy drug abusers and 25% for other drug abusers who are otherwise in need of treatment	Additional $336 million spent on illnesses where drugs were secondary diagnosis and $840 million spent by alcohol, drug abuse, mental health institutions, and support services. Much of this amount is likely to overlap with the estimate of drug treatment costs. No separate data exist by type of user; we arbitrarily assume heavy drug abusers (who make up 45% of "in need of treatment" population) account for 75% of medical costs
Lost productivity due to premature death	3 to 14% annual risk of premature drug-caused death	3% based on 10,000+ deaths (US DOJ, 1994, p. 10) and 5.5 million users in need of treatment. 9% based on narcotics addicts (Hser *et al.*, 1993). 14% based on excess odds ratio from Kouzis *et al.* (1995)	According to Clinton (1996b, p. 41), over 25,000 drug-related deaths occur annually. To the extent long-term illnesses are associated with drug use but not clearly identified as being the cause of death, 3% estimate is too low. 14% estimate might include some drug users who were victimized by drug-related homicides, thus might be slight double-counted with that category. Note: Assumes heavy drug user would otherwise be productive employee
	Lost productivity per death of $1.04 million	Rice *et al.* (1990, p. 136) converted from 6 to 2% discount rate and increased from 1985 to 1997 dollars	
	Annual risk of death to a heavy drug user is valued at approximately $1485 to $6690	Over the drug user's expected lifetime, this totals $31,800 $143,000	

Crime (including *victim costs and associated criminal justice costs*)	*Per heavy drug user per year of use:* Assault, 0.008 to 0.032 Robbery, 0.572 to 0.878 Burglary, −0.189 to 1.279 Larceny, 1.753 to 5.597 MV theft, −0.273 to 0.209 Costs per incident taken from Tables II and III	Rajkumar and French (1997), based on crime rates reported by TOPS drug treatment participants. Low estimate is based on reduced crime following treatment (note: negative number indicates increased crime following treatment). High estimate is based on total crimes committed prior to treatment	*Note: Prior estimates published by Rice et al.* (1990) were based on outdated studies of incarcerated heroin users from Cruze *et al.* (1981) and Harwood *et al.* (1984), who arbitrarily attributed 10% of violent crimes in U.S. to drugs Note: Newer information from DATOS drug treatment data is just becoming available and was not available at the time this was first drafted. However, according to Craddock *et al.* (1997, Table 3), a higher percentage of TOPS patients had engaged in a predatory criminal act during the year prior to treatment than in the DATOS sample
Criminal justice costs associated with drug use	Annual risk of arrest estimated to be 6.6% Costs of criminal justice system taken from Table III, assume processing drug cases costs the same as robbery, burglary, or vehicle theft	Arrest rate based on FBI data on drug-defined crime arrests (Maguire and Pastore, 1994, Tables 4.1 and 4.34). Assumed that 25% of arrests involve heavy drug users (based on 25% of drug users who are heavy drug users). Conviction rate taken from Langan and Graziadel (1995, Table 1)	Note: Since no information is available on percentage of arrests or convictions that involve heavy drug users, these estimates are very crude. This is also an underestimate, as it excludes the additional processing costs of the 85% of arrested users who are not convicted or who are convicted of misdemeanors
High-school dropout			
Productivity	$300,000 lifetime earnings per dropout	Census data on wage differentials by education. Reduced by 25% to control for selection bias (Catterall, 1987)	Consistent with previous studies. Note: selection bias effect is highly uncertain
Fringe benefits	$75,000 lifetime fringes per dropout	U.S. Chamber of Commerce (1990) fringe benefits estimated at 25%	Although fringes are a somewhat lower percentage of income for higher paid professionals, this more accurately reflects blue collar, high-school graduates, etc.
Nonmarket benefits	$93,750 to $375,000 lifetime per dropout (25 to 100% of earnings plus fringes)	100% estimate based on Haveman and Wolfe (1984). 25% estimate is arbitrary but based on claim by Michael (1973) that nonmarket benefits are less	Note: $375,000 is likely too high since some of nonmarket benefits are private and should not enter into social cost benefit analysis

Table II. Annual Cost to Victims of a Career Criminal (1997 Dollars)[a]

Crime	Tangible	Intangible	Risk of death	Total per crime	Number per year	Total per year
Rape	$6000	$96,000	$1000	$103,000	0.1	$10,300
Robbery	$2700	$6700	$6200	$15,600	1.25	$19,500
Agg. assault	$1800	$9200	$29,700	$40,700	3.0	$122,100
Burglary	$1300	$350	—	$1650	1.25	$2065
Larceny	$440	—	—	$440	2.5	$1000
MV theft	$4,100	$350	—	$4500	2.5	$11,200
Total					**10.6**	**$165,000**

[a]Numbers may not add due to rounding. *Source*: Dollar estimates taken from Miller *et al.* (1996), updated to 1997 dollars. See text for details on the estimated number of crimes per year.

Table III. Annual Criminal Justice-Related Costs of Career Criminals (1997 Dollars)[a]

Crime	Criminal investigation	Legal defense	Prison, jail	Parole	Probation	Total per year	Number of crimes[b]	Total[b]
Murder	$8700	$1100	$118,500	$607	$70	$163,500	—	—
Rape	$380	$30	$2400	$24	$7	$2900	0.1	$290
Robbery	$890	$60	$5800	$72	$25	$6900	1.25	$8900
Agg. assault	$870	$70	$3500	$97	$75	$4600	3.0	$18,100
Burglary	$765	$20	$1500	$46	$50	$2300	1.25	$2900
Larceny	$540	$20	$700	$44	$50	$1400	2.5	$3500
MV theft	$1550	$35	$1300	$77	$90	$3000	2.5	$7600
Total							**10.6**	**$40,000**

[a]*Source*: See Cohen *et al.* (1994) for detailed methodology; estimates updated to 1997 dollars.
[b]Murder costs have been incorporated into each crime through the risk of death. Numbers may not add due to rounding.

3.4. Forgone Earnings of Career Criminals, $W * T_i$

A prisoner is generally not a productive member of society while incarcerated. The loss in productivity is proxied by loss in earnings to the offender ($W * T_i$). Cohen *et al.* (1994, p. 136) review the literature and estimate the preconviction (legitimate) earnings of convicted felons to be about $5285 in 1987 dollars ($7542 in 1997 dollars). Based on the average of 8 years in jail or prison estimated above, the total forgone earnings for career criminals due to incarceration is $60,000, or $52,000 in present value terms.

3.5. The Present Value of a Lifetime of Crime

Table IV summarizes the external costs imposed by a typical crime career. Juvenile delinquency between age 14 and age 17 imposes $83,000–$335,000 in external costs, while adult career criminals add an additional

Table IV. Lifetime Costs of a Career Criminal (1997 Dollars)[a]

Cost category	Total costs	Present value (2% discount rate)
Juvenile career		
Victim costs	$62,000–$250,000	$60,000–$244,000
Criminal justice-related	$21,000–$84,000	$20,000–$82,000
Subtotal: Juvenile Career	$83,000–$335,000	$80,000–$325,000
Adult career		
Victim costs	$1,000,000	$850,000
Criminal justice-related	$335,000	$283,000
Offender Productivity	$64,000	$54,000
Subtotal: adult career	$1,400,000	$1,200,000
Total	**$1.5–$1.8 million**	**$1.3–$1.5 million**

[a]Numbers may not add due to rounding.

$1.4 million. The total external costs of a life of crime are estimated to range from approximately $1.5 to $1.8 million. Of that amount, about 25% are tangible victim costs, 50% lost quality of life, 20% criminal justice costs, and 5% offender productivity losses.

Although the average career is 6 years plus 8 years of incarceration, these events happen at different times. A time path of offending and incarceration was estimated covering a span of 14 years (ages 18 through 31). The estimated time path was based on age-specific conviction rates for high-level chronic offenders (Nagin *et al.*, 1995, Table 1, p. 113). For example, 31% of chronic offender convictions occur between age 18 and age 19, whereas only 7% occur between age 30 and age 31. Thus, it is assumed that 31% of the crimes (and incarcerations) occur during ages 18 and 19. Discounting to present value yields an estimate of $1.3 to $1.5 million.

4. DRUG ABUSE

Drug abuse imposes costs on users, their families, and society at large. Conceptually, the lifetime cost imposed by a drug user is

$$\begin{aligned}&\text{Lifetime costs}\\&=\sum_k (1-\beta)^{k-1}[(1-p) * \mathrm{DC}_k + s_k * \mathrm{DT} + W * \mathrm{H}_k\\&+ u_k * M + d_k * \mathrm{PROD}\\&+ \lambda_k * (\mathrm{VC} + \mathrm{CJ} + \mathrm{CI} * T_k + W * T_k)\\&+ a_k * (\mathrm{CJ} + \mathrm{CI} + W * T_k) + v_k * \mathrm{TC}]\end{aligned}$$

where

p = risk premium for drug distributors
DC = retail price of drugs to illegal users
s = fraction of offenders in drug treatment programs
DT = drug treatment costs
H = hours of lost productivity while a drug user
u = risk of medical emergency
M = medical costs associated with drug use
d = risk of death from drug overdose or related illness
PROD = value of future productivity lost due to drug-related death
λ = net criminal offenses, "drug-related" crimes (not drug-defined crimes)
a = arrest rate for drug-defined crimes (not drug-related crimes)
v = risk of third-party costs
TC = third-party costs (e.g., crack babies, abused or neglected children)
k = year 1 through year K of drug use.

Inside the brackets are eight terms: $(1-p) * \mathrm{DC}_k$ (opportunity cost of resources associated with drug distribution), $s_k * \mathrm{DT}$ (cost of drug treatment), $W * \mathrm{H}_k$ (lost productivity due to drug abuse), $u_k * \mathrm{M}$ (medical costs), $d_k * \mathrm{PROD}$ (lost productivity due to premature death), $\lambda_k * (\mathrm{VC} + \mathrm{CJ} + \mathrm{CI} * T_k + W * T_k)$ (crime victim and criminal justice costs), $a_k * (\mathrm{CJ} + \mathrm{CI} * T_k + W * T_k)$ (criminal justice costs due to drug-defined crimes), and $v_k * \mathrm{TC}$ (third-party costs).

4.1. The Population of Heavy Drug Users

Although about 11.4 million Americans (5.5%) reportedly used drugs within the past month, an estimated 5.5 million Americans are "in need of treatment." The number of "heavy cocaine users" has been estimated to be between 1.7 and 1.8 million, with the number of heavy heroin users being 0.7 million. (Office of National Drug Control Policy, 1991, pp. 23–25). For the purposes of this paper, we focus on "heavy drug abusers," an assumed baseline of approximately 2.5 million Americans who are heavy users of cocaine or heroin. Since heavy drug users are often in hard-to-reach populations, they may be underreported in national surveys. Wright *et al.* (1995) estimate that the number of heavy users of heroin is 40–80% higher, and the number of heavy cocaine users is 20–40% higher.

Absent data on the probability that heavy drug users will continue using drugs each year, we can infer "retention" rates from aggregate age-specific data on drug use (Harrison and Gfroerer, 1992, p. 432, Table 3). A quadratic

specification fit best and is used in the analysis that follows.[5] It is assumed that drug use begins at age 15 and continues (with some positive probability) through age 60. The heavy drug user is expected to continue using drugs for approximately 14 years.

4.2. Opportunity Cost of Resources Associated with the Manufacture and Sale of Drugs, $(1-p) * DC_k$

Based on the proportion of heavy cocaine and heroin users, the average annual retail price paid for drugs (DC_k) is estimated to be \$15,000 in 1997 dollars. This estimate can be combined with the "retention rate" to determine the expected lifetime value of purchases by a typical heavy drug user, approximately \$336,000. However, the "street price" of drugs is an overestimate of the true opportunity cost of resources devoted to drug distribution. Dealers are paid a risk premium above their opportunity cost (i.e., legitimate market wage) to accept the risks of this line of work. Although the "opportunity cost" of the drug dealer should be considered a social cost (as it represents lost labor productivity), the risk premium is simply a transfer of resources from the drug buyer to seller and does not represent a social cost. Moreover, since it is a *voluntary* transfer, it should not be considered an *external cost*. Of course, if a drug user steals money to pay for the high cost of a drug habit, that crime would be considered a social cost and is already included in our estimate of the crimes committed by drug abusers.

According to Reuter *et al.* (1990), hourly earnings in legitimate occupations are only 25% of earnings from illegal drug dealing in Washington, DC. Since this cost component is subject to the added uncertainty of the value of the risk premium, it is presented as a range from 25 to 50% of the street price. Thus, the lifetime opportunity costs $[(1-p)\sum_k DC_k]$ are estimated to be \$84,000–\$168,000, or \$63,000–\$126,000 in present value terms.

4.3. Drug Rehabilitation Expenses, $s_k * DT$

More than \$1.73 billion was spent in 1989 to provide drug treatment to users [U.S. Department of Justice (U.S. DOJ), 1992, p. 133]. Although we do not know how many different individuals were treated, this figure can be converted into an expected cost per illegal drug user in need of treatment ($s_k * DT$), \$314 per drug user in need. Updating to 1997 dollars and converting these estimates into a lifetime total yields a cost of \$10,200, or \$7,900 in present value terms.

[5]The estimated regression equation is $2.445 - 0.08057(\text{age}) + 0.000679(\text{age}^2)$. Both coefficients are significant to the 5% level, with the overall R^2 being 0.966 and the standard error of the estimate being 0.09.

4.4. Reduced Productivity Due to Decreased Work Ability, $W * H_k$

Heavy drug users who are employed in the legitimate sector may be less productive than they would be if they were not heavy drug users. Rice *et al.* (1990, Table 40, p. 104) estimate reduced wages, $W * H_k$, due to drug use by comparing the reported income of drug users and nonusers. These differences were estimated in the context of a multiple regression model that controls for many other factors including alcohol abuse, mental disorder, and demographic characteristics. Since they do not distinguish between casual and heavy users, the estimates should be considered relatively conservative for heavy drug users.

More recently, French *et al.* (1996) reviewed the existing literature on productivity and drug use and found many conflicting results, including some studies that found a positive relationship. They further compiled a new microlevel dataset on employees at six worksites in the United States and concluded that there is little relationship between drug use and absenteeism. However, French *et al.* (1996) consider only workers— not heavy drug users who have left the workplace and live off welfare or are homeless.

Using the Rice *et al.* (1990) productivity loss estimates (updated to 1997 dollars) and the ratio of male to female drug users, the total lifetime productivity losses are estimated to be $27,600, or $17,000 in present value terms. Given the relatively small dollar amounts (compared to total lifetime earnings), this is not far from the "zero cost" suggested by French *et al.* (1996).

4.5. Medical Costs Associated with Overdose or Other Drug-Related Illness, $u_k * M$

According to a 1985 health care survey (U.S. DOJ, 1992, p. 132), about $906 million was spent on illnesses where the primary diagnosis resulted from illegal drug use (e.g., drug-induced psychosis). An additional $190 million was spent on health care for drug-related AIDS cases. Assuming that 75% of these costs are due to heavy drug abusers, the average cost per year per heavy drug user was $475 in 1997 dollars. The present value of additional lifetime medical costs to heavy drug users ($\sum_k u_k * M$) is estimated to be $11,000, or $8600 in present value.

4.6. Premature Death Due to Drug Abuse, $d_k * PROD$

Drug abuse may also lead to premature death either through drug-related episodes (e.g., overdoses) or through long-term illnesses associated with drugs. According to Vital Statistics data, there were over 10,000 deaths in 1989 directly attributable to drug use (U.S. DOJ, 1994, p. 10). Based on

5.5 million users who are "in need of treatment," this translates into about a 3% lifetime risk of death for drug abusers over their 14-year career length. However, the risk of death may be considerably higher for very heavy drug users such as heroin or cocaine addicts. Hser *et al.* (1993) report a drug overdose death rate for narcotics addicts of about 9% after a 24-year follow-up.[6] Kouzis *et al.* (1995) estimated that drug abuse/dependence results in a 12.4 times increased odds of dying during a 1-year period after adjusting for sociodemographic characteristics. Based on the retention rate calculated above and the overall U.S. mortality rate by age, this implies a 14% increased death rate.

Unlike murders, the pain, suffering, and lost quality of life associated with premature death are internalized by the offender. Thus, only the tangible costs such as lost productivity and medical expenses are included as an external cost of premature death due to drug abuse. The present value of lost productivity for the average drug abuse death is estimated to be $1.04 million in 1997. Based on the estimated range of 3–14% and retention rates identified above, the future risk of death for a drug abuser ranges from $47,700 to $223,000. In present value terms, this translates into $37,000–$173,000. These estimates generally exclude drug-related homicides (unless the victim is also a heavy drug abuser), which are considered below.

4.7. Additional Crime Committed by Drug Users, $\lambda_k * (VC_k + CJ + CI * T_k + W * T_k)$

Heavy drug users may resort to criminal activity to support their habits or may be involved in assaults or murders in the process of dealing in the drug trade (Nurco *et al.*, 1991). Although the government widely publishes statistics on the number of convicted felons found to be under the influence of drugs at the time of their arrest, these data tell us little about the causal connection between drugs and crime. To understand the drugs–crime nexus, detailed studies need to be done to determine the underlying causes of both.

Rajkumar and French (1997) examine self-reported crime rates from the 1979 TOPS drug treatment program. They find lower crime rates 1 year following treatment compared to 1 year before treatment. Since not all treated clients are completely off drugs during the post treatment period, differential crime rates might result in an underestimate of the amount of crime that would be averted if all clients were drug-free. Thus, as an upper

[6]Although 27.7% of the addicts were dead, only 32.4% of these deaths were "directly due to drug overdose" (p. 580). Thus, 32.4% × 27.7% is equal to 8.95% of addicts who died as a result of a drug overdose. An additional 28.6% were the result of "homicide, suicide, or accident," and 39.1% the result of other causes such as alcohol-related, smoking-related, or other illness.

bound, we assume that all preintervention crime is "caused" by drug abuse.[7] Using this approach and valuing crime by the cost to victims plus criminal justice costs (from Tables II and III), the average annual cost of drug-related crime in this population of drug users ranges from $13,000 to $36,000.

FBI statistics on the number of murders and nonnegligent manslaughters known to police are another potential source of data. In 1993, 1287 murders were allegedly due to narcotic drug laws, and 262 others involved arguments due to the influence of narcotics (Maguire *et al.*, 1995, Table 3.111, p. 334). Based on 5.5 million drug users in need of treatment, this would amount to a risk of death of 0.0003. This amounts to about $213 per drug user per year in 1997 dollars. This estimate might be too low to the extent that heavy drug abusers have a higher risk than the population of those in need of treatment.

Combining the estimates of drug-related homicides and drug-related crimes and multiplying by the drug abuse "retention rate," the total lifetime cost of drug-related crime and homicides for the average heavy drug user is estimated to range from $283,000 to $781,000, or $220,000–$606,000 in present value terms.

4.8. Criminal Justice Costs Associated with Drug Use, $a_k * (\mathrm{CJ} + \mathrm{CI} * T_k + W * T_k)$

There were 1,066,400 arrests for drug-defined crimes (possession, transporting, dealing) in the United States in 1992, about 68% of which were for possession (Maguire and Pastore, 1994, Tables 4.1 and 4.34). If we assume that 25% were arrests against heavy users (based on 2.5 million heavy drug users versus 11 million current users), then approximately 180,000 arrests occur annually among our population of heavy drug users. In 1992, an estimated 109,426 individuals were convicted in state courts for felony drug possession, which represents about 15% of drug possession arrests (Langan and Graziadel, 1995, Table 1). Using the same methodology as shown in Table III, and assuming that the cost per case of dealing with a drug possession is similar to that for a robbery, burglary, or motor vehicle theft, the average criminal justice system cost of a heavy drug user is approximately $40,500 over a drug usage career, or $29,700 in present value. This is an underestimate, as it excludes the additional processing costs of the 85% of arrestees who are not convicted or who are convicted of misdemeanors.

[7]Even posttreatment reductions might not all be attributable to drug problems directly, since intervention programs might affect individuals in ways other than reducing drug use.

4.9. Third-Party Costs (e.g., Crack Babies, Malnourished, Neglected, or Mistreated Children), $V_k * TC$

Children may be the victim of the drug abuse of their parents, through neglect, abuse, or other maltreatment. Although Miller *et al.* (1996) provide estimates of the prevalence and costs of childhood abuse and neglect, there is no solid evidence that would permit us to estimate the percentage of these cases that are caused by drug abuse.

Another third-party effect is the cost of crack babies. An estimated 45,000 babies born each year were exposed to cocaine (National Institute on Drug Abuse, 1996). However, since these estimates include all women who use crack at any time during pregnancy, they are an overestimate of the number of crack babies born. A study of 8974 crack babies born in eight cities in 1990 estimated the cost associated with hospital delivery, perinatal care, and foster care through age 5 for those children to be $500 million–$50,638 per child (Kusserow, 1990, p. 3). This estimate is considered to be low, since other services are often needed, including special educational and rehabilitation services. Despite the potentially high cost per child, there are relatively few crack babies born compared to heavy drug users. Even if 45,000 crack babies are born annually, when they are allocated over the estimated 1 million women who are heavy drug users, the lifetime cost per woman who illegally uses drugs is relatively small. Given the high degree of uncertainty in both the number of babies and the cost per baby, this component is excluded from the summary tables.

4.10. The Present Value of a Heavy Drug Abuser

Table V summarizes the above estimates of the cost of a heavy drug user. The total lifetime costs of a heavy drug user are estimated to range from $483,000 to $1.26 million. At a 2% discount rate, this becomes $370,000 to $970,000. These estimates are for hard-core drug abusers. The cost imposed by the "average" drug user would be significantly lower, as there are at least twice as many "casual" users who impose lower costs per person than heavy drug users.

5. HIGH-SCHOOL DROPOUTS

Dropping out of high school is highly correlated with juvenile delinquency. Tracy *et al.* (1990, p. 53) report graduation rates for white males with low-SES backgrounds of 53.8% for nondelinquents, 33.2% for one-time offenders, 17.8% for nonchronic recidivists, and 3.3% for chronic recidivists. Although dropping out of high school does not necessarily lead to a life of crime, reduced employment opportunities might lower the expected cost to

Table V. Lifetime Costs of a Heavy Drug User (1997 Dollars)[a]

Cost category	Total costs	Present value (2% discount rate)
Resources devoted to drug market	$84,000–$168,000	$63,200–$126,400
Drug treatment costs	$10,200	$7900
Reduced productivity[b]	$27,600	$17,000
Medical costs	$11,000	$8600
Premature death	$31,800–$223,000	$24,700–$173,000
Drug-defined crime (criminal justice costs)	$40,500	$29,700
Subtotal	$200,000–$480,000	$150,000–$360,000
Additional crime (e.g., robbery, assault, murder)	$283,000–$781,000	$220,000–$606,000
Total	**$483,000–$1,260,000**	**$370,000–$970,000**

[a]Numbers may not add due to rounding.
[b]See text. Although this appears to be small, a good portion of productivity losses may be accounted for in the "drug purchases" category. This is also likely an underestimate, as it is an average over all drug users, not just heavy users. Third-party costs such as crack babies and child abuse or neglect are excluded due to lack of data.

potential criminals in engaging in illegal activities (Freeman, 1996). Although an earlier section of this paper estimated the external costs of a career criminal, dropping out of high school has other social consequences. The total lifetime cost of a high-school dropout who leaves school at age D instead of age 18 and who retires at age 65 is

$$\text{Lifetime costs} = \sum_{i=18}^{65} (1-\beta)^{I-D}[(1+f) * (W_{ij} - W_{ij}) * H_{ij}]$$
$$- \sum_{i=D}^{18} (1-\beta)^{I-D}[(1-f) * W_{iN} * H_{ij}]$$
$$+ \sum_{I=D}^{\text{Lifetime}} (1-\beta)^{I-D}[\text{PRIV}_i + \text{PUB}_i]$$

where

W = wage rate
H = annual number of hours worked
f = fringe benefit rate.
PRIV = additional private benefits to education
PUB = public (only) benefits to education
I = year
J = N (non-high school), G (high-school graduate)

The first of these three components is $(1+f) * (W_{iG} - W_{iN}) * H$, the difference in wages and fringes for a high-school graduate versus a dropout. The

second component adds back the wages and fringes during the years the high-school dropout would otherwise have been in school but is now working. The third component accounts for all other private and public benefits to education.

5.1. Lost Wages and Productivity, $W_G - W_N$

Higher wages and increased productivity are the main benefits that have been quantified for a high-school graduate. Hansen (1963), Catterall (1987), Chaplin and Lerman (1996), and others have compared the lifetime earnings of U.S. males based on educational attainment. Based on the mean monthly earnings by age for high-school versus non-high-school graduates, the total lifetime wage differential is estimated to be $400,000 in 1997 dollars.[8]

Gross differences in earnings ignores the fact that the average youth who drops out of high school is not the same as the average youth who graduates. Ability and aptitude alone will account for some of these differences. This selection bias effect has been estimated to account for about 25% of the differences in earnings between high-school graduates and dropouts (Catterall, 1987). Thus, the estimated lifetime earnings differential of graduating from high school is reduced to $300,000, or $155,000 in present value. This figure is comparable to estimates by earlier authors.

5.2. Fringe Benefits, *f*

Haveman and Wolfe (1984, p. 382) report that "nonwage labor market remuneration" is between 10 and 40% of wages. A commonly used estimate of the value of fringe benefits is published by the U.S. Chamber of Commerce (1990), which estimates the monetary value of fringe benefits to be about 25%.[9] Based on lost earnings of $300,000, estimated lost fringe benefits are $75,000.

5.3. Value of Nonmarket Private and Public Benefits, PRIV + PUB

In addition to productivity increases, an educated population might benefit society from increased social cohesion and improvements in technology, medicine, and other forms of knowledge. Many of these other benefits are difficult to measure, especially those without a direct market analog. Moreover, some of these benefits (e.g., social cohesion) may not be "marginal" effects associated with any one individual high-school graduate. Haveman and Wolfe (1984) catalogued all of the potential private and public

[8]Wage rate differentials were taken from the *Economic Report of the President, 1997.*

[9]This figure excludes the value of paid vacations and sick leave, since compensation for time off is already included in earnings calculations.

Table VI. Lifetime Costs of Dropping Out of High School (1997 Dollars)[a]

	Total costs	present value (2% discount rate)
Lost wage productivity	$300,000	$155,000
Fringe benefits	$75,000	$39,000
Nonmarket losses	$95,000–$375,000	$49,000–$194,000
Total	**$470,000–$750,000**	**$243,000–$388,000**

[a]Numbers may not add due to rounding.

benefits associated with education and reviewed the empirical literature and state-of-the-art estimation techniques.[10] Haveman and Wolfe (1984) estimated that total nonmarket benefits of education approximately equal market benefits. However, some of the nonmarket benefits of education they identify (e.g., the pure entertainment value) are purely private benefits internalized by the recipient. One could argue to exclude these benefits from a social cost–benefit analysis as well as from our more general definition of "external benefits." Michael (1973, pp. 324–325) also attempted to infer the "nonmarket productivity" value of education—such as improved productivity in household activities and health status—but concluded that the monetary return to education was probably the larger of the two effects. Given the lack of solid data, I assume that the nonmarket value of education ranges from 25 to 100% of the market value: $95,000–$375,000.

5.4. The Present Value of Dropping Out of High School

Table VI summarizes the above estimates. The cost of dropping out of high school (or benefit of high-school graduation) is estimated to be $470,000–$750,000 in 1997 dollars, or $243,000–$388,000 in present value. These should be looked upon as order-of-magnitude estimates at best. Although we know that the benefits of a high-school education are higher

[10]Among the private benefits they consider are (1) individual productivity/wages, (2) nonwage labor market remuneration such as fringe benefits, (3) enhanced enjoyment of leisure activities, (4) enhanced ability to produce further individual knowledge, (5) enhanced nonmarket productivity such as housework or do-it-yourself repairs, (6) improved relationship between family members, (7) improved child development and nurturing activities, (8) improved health status, (9) improved family health status, (10) more efficient use of family planning and preferred family size, (11) the pure entertainment value of education itself, (12) improved ability of consumers to make informed purchase decisions and thus get more value from their decisions, (13) reduced job search costs, and (14) improved marital choice. Among the public benefits they consider are (1) crime reduction, (2) improved social cohesion, (3) increased technological improvements, (4) more equitable income distribution, (5) increased savings rates, and (6) increased charitable giving.

Table VII. Summary of the Monetary Value of Saving a High-Risk Youth[a]

	Total costs	Present value (2% discount rate)
Career criminal	\$1.5–\$1.8 million	\$1.3–\$1.5 million
Heavy drug user	\$483,000–\$1,260,000	\$370,000–\$970,000
High-school dropout	\$469,000–\$750,000	\$243,000–\$388,000
Less duplication: (crimes committed by heavy drug users)	(\$283,000–\$781,000)	(\$220,000–\$606,000)
Total	**\$2.2–\$3.0 million**	**\$1.7–\$2.3 million**

[a]Numbers may not add due to rounding. All costs are in 1997 dollars.

than the pure monetary earnings supplement, the degree to which the nonmonetary benefits are higher is not well-known.

6. SUMMARY OF MONETARY ESTIMATES, POLICY IMPLICATIONS, AND CAUTIONARY REMARKS

Table VII summarizes the estimates presented in this paper. The present value of saving a high-risk youth is estimated to be \$1.7 to \$2.3 million. These figures have been adjusted to account for the fact that the three categories (crime, drugs, high-school dropout) are not mutually exclusive. For example, a career criminal may also be a heavy drug user.

6.1. Uncertainty of Estimates and Sensitivity Analysis

Although these estimates are subject to considerable uncertainty, they appear to be both reasonable and substantiated with real-world data. Some of the key uncertainties are listed below, along with a sensitivity analysis that examines the effect of varying the assumptions.

6.1.1. Monetized Intangible Costs

Approximately 30% of the benefits of saving a high-risk youth consist of the monetary valuation of intangible losses such as pain, suffering, and lost quality of life. As shown in Table VIII, saving a high-risk youth will prevent 60–80 crimes and result in \$1.2–\$1.5 million in tangible benefits. Thus, even if we exclude the monetary value of nonmonetary losses, the cost of a high-risk youth is substantial.

6.1.2. Statistical Value of Life

Although we adopted a \$3.4 million statistical value of life, Viscusi (1993) places this value between \$3 and \$7 million. This estimate primarily

Table VIII. Summary of Crime Reduction and Tangible Monetary Benefits of Saving a High-Risk Youth[a]

Crime	Number of crimes
Murder/homicide	0.18–0.21
Rape	0.64–0.75
Assault	19.1–22.5
Robbery	8.0–9.4
Burglary	8.0–9.4
Larceny	16.8–18.8
MV theft	16.8–18.8
Total crimes	68–80
	Tangible dollar loss
Total (non-discounted)	$1.7–$2.4 million
Present value at 2% discount rate	$1.2–$1.5 million

[a]Numbers may not add due to rounding. All costs are in 1997 dollars.

affects the cost of murders caused by career criminals.[11] If we double the value of life to $6.8 million (near the upper end of the range of estimates in the literature), the lifetime cost of a career criminal (shown inTable IV increases by about 40%. Alternatively, if we reduce the statistical value of life by 50% (to $1.7 million), the lifetime cost of a career criminal is reduced by 20%.

6.1.3. Length of Criminal Career

Blumstein *et al.* (1986) report a career length of 5–15 years, with a median of about 6 years. If the high end of the range is adopted (15 years), the present value of the lifetime costs of a career criminal increases by nearly $1 million.

6.1.4. Average Number of Crimes Committed, λ

This paper adopts the midpoint of the range of estimated annual number of crimes committed by career criminals (10.6 per year), resulting in an annual cost of crime of $165,000 and lifetime cost of crime of $850,000 in present value terms. If the lower end of that range is used (7 per year), annual costs reduce to $110,000, and the present value of lifetime crime

[11]It might also be argued that since most murder victims are relatively low-end wage earners, the lower end of the value of life should be used. Such a statement involves a value judgment, however, that criminal justice policy should explicitly take into account the wealth of potential beneficiaries in determining whether or not to adopt a policy.

costs reduces to $550,000. If the higher end of the range is used (14.2 per year), costs increase to $230,000 or $1.1 million in lifetime present value costs.

Implicit in the above formulation is the assumption that we are dealing with the "typical" or median career criminal. However, there is considerable variation in annual crime rates. For example, Canela-Cacho *et al.* (1997) report that mean λ's are 5–10 times higher than medians. The most serious offenders (90th percentile) have mean λ's that are 5–20 times higher than the means for all offenders. Thus, if a program could successfully target the worst offenders, it could save as much as $17 million (based on a 6-year career), or $36 million (based on a 15-year career) per high-risk youth who is saved from a life of crime.

6.1.5. Social Discount Rate

The choice of a discount rate can have a dramatic impact on estimated costs, depending on the length of time over which costs are discounted. If our 2% rate is too low, the estimates presented here will be too high, and policy decisions might err on the side of adopting intervention programs that do not necessarily pass a cost–benefit test. Changing from a 2 to a 10% discount rate reduces the cost of a career criminal by about 35%, the cost of a heavy drug user by 50%, and the cost of a high-school dropout by over 90%. The reason for such a large reduction for high-school dropouts is that the benefits accrue over an entire worklife span of about 40 years, while the other two categories involve about 15-year time spans. Overall, the cost of saving a high-risk youth reduces by about 50% when moving from a 2 to 10% rate.[12]

6.2. Policy Implications

Despite the fact that there are good reasons for using these estimates in some contexts, analysts should be aware of the limitations of this approach. First, the population used to estimate costs may not be the same as the target population for the program under consideration. The target population of this study is a relatively small proportion of the population of youth. According to Snyder *et al.* (1996, p. 14), about 6% of juveniles in the United States were arrested in 1994. Only 7% of those youth were arrested for a violent crime index offense (murder, robbery, rape, or aggravated

[12]A 10% discount rate was used by many government agencies and mandated by the Office of Management and Budget for regulatory policy evaluations until recently, when the rate was lowered to 7%. See Kolb and Scheraga (1990) for a discussion of the original 10% rate. The revised guidelines are given by the Office of Management and Budget (1992).

assault). Thus, the most directly comparable population to the high-risk youth profile presented in this paper constitutes less than 0.5% of juveniles in the United States. Alternatively, Greenwood *et al.* (1996, p. 51) estimate that 4.27% of juveniles in California are "high rate offenders."

To illustrate how one might use the estimates in this paper, consider the prevention programs recently evaluated by Greenwood *et al.* (1996, p. 25). They estimate the present value cost of a high-school graduation incentive program to be about $11,816 per student. Comparing this to the $243,000–$388,000 estimated monetary value of graduating high school, one could infer that a graduation incentive program would need a success rate of at least 3 to 5% to be cost-beneficial. Delinquent supervision, which costs about $10,000 per participant, would need only about a 1 in 1000 success rate to recover the benefits of saving one youth from becoming a career criminal. Home visit/day care programs that target children aged 0 through 5 are estimated to cost $26,290. To compare potential benefits, one would need to discount the estimates in this paper further to account for the fact that we start calculating benefits at age 14. Thus, the $1.3 to $1.5 million costs from a career criminal would be reduced to about $960,000 to $1.1 million. To be cost-beneficial, home visit/day care programs would need a 2–3% success rate.

As another example, suppose that a 2-year intensive youth program for 100 youth cost $500,000 ($5000 per youth). If program evaluators estimate that the program will "save" one youth from dropping out of high school, embarking on a life of drug abuse and crime, the program will generate total benefits of $1.7 to $2.3 million in present value. In this example, the result is the same regardless of whether crimes are monetized beyond their pure tangible consequences, i.e., if Table VIII is used instead of Table VII. However, if the same program prevented only one youth from dropping high school, it would not pay for itself, with net benefits less than the $500,000 cost.

As the above example illustrates, a cost–benefit analysis can lead to opposite policy implications depending on which assumptions are adopted. Uncertainties abound, including such factors as discount rates, rates of crime commission by career criminals, the reasonableness of monetized estimates of pain, suffering and reduced quality of life, etc. Regardless of these uncertainties, however, this form of quantitative analysis provides much useful information. In some cases, it will highlight the fact that under almost any reasonable assumption, the costs of a program do (or do not) exceed its benefits. In other cases, a sensitivity analysis will highlight which uncertainties are most important and which require further research.

Finally, although the estimates presented here approximate the social costs imposed by a high-risk youth, those costs will not necessarily be eliminated if the youth is replaced with another one (see, e.g., Cook, 1986). A

reduced crime rate might induce others to engage in more crime as the number of opportunities to commit crime has increased. In the context of high-risk youth, if gangs recruit another youth who might not have gone over the line of criminal behavior, then the benefits of saving the first youth might be offset.

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REFERENCES

Barnett, W. S., Schweinhart, L. J., Barnes, H. V., and Wikart, D. P. (1993). Cost benefit analysis. In *Significant Benefits: The High/Scope Perry Preschool Study Through Age 27*, High Scope Press, Ypsilanti, MI, Chap. 7.

Blumstein, A., and Petersilia, J. (1995). Investing in criminal justice research. In Wilson, J. Q., and Petersilia, J. (eds.), *Crime*, San Francisco, Chap. 20.

Blumstein, A., Cohen J., Roth, J. A., and Visher, C. A. (eds.) (1986). *Criminal Careers and Career Criminals*, National Research Council, National Academy Press, Washington, DC.

Canela-Cacho, J., Blumstein, A., and Cohen, J. (1997). Relationship between the offending frequency (λ) of imprisoned and free offenders. *Criminology* 35: 133–176.

Catterall, J. S. (1987). On the social costs of dropping out of school. *High School J.* 71: 19–30.

Chaplin, D., and Lerman, R. (1996). Dropping out: Public and private costs. Urban Institute Working Paper.

Clinton, W. (1996a). *Economic Report of the President 1997*, U.S. Government Printing Office, Washington, DC.

Clinton, W. (1996b). *The National Drug Control Strategy: 1996*, U.S. Government Printing Office, Washington, DC.

Cohen, M. A. (1995). Report to Urban Institute on the monetary value of saving a high-risk youth. Owen Graduate School of Management Working Paper, Vanderbilt University, Nov.

Cohen, M. A. (1988). Pain, suffering and jury awards: A study of the cost of crime to victims. *Law Soc. Rev.* 22(3): 538–555.

Cohen, M. A., Miller, T. R., and Rossman, S. B. (1994). The costs and consequences of violent behavior in the United States. In Reiss, A. J., Jr., and Roth, J. A. (eds.), *Volume 4:*

Consequences and Control of Understanding and Preventing Violence, National Research Council, National Academy Press, Washington, DC, pp. 67–166.

Cook, P. J. (1986). The demand and supply of criminal opportunities. In Tonry, M. H., and Morris, N. (eds.), *Crime and Justice: An Annual Review of Research*, University of Chicago Press, Chicago, pp. 1–27.

Craddock, S. G., and Rounds-Bryant, J. L. (1997). Characteristics and pretreatment behaviors of clients entering drug abuse treatment: 1969 to 1993. *Am. J. Drug Alcohol Abuse* 23(1): 43–59.

Cruze, A. M. *et al.* (1981). *Economic Costs to Society of Alcohol and Drug Abuse and Mental Illness—1977*, Final Report submitted to Alcohol, Drug Abuse and Mental Health Administration, Report RTI/1925/00-14F, Research Triangle Institute, Research Triangle Park, NC.

Freeman, R. B. (1996). Why do so many young American men commit crimes and what might we do about it? *J. Econ. Perspect.* 10: 25–42.

French, M. T., Rachal, J. V., and Hubbard, R. L. (1991). Conceptual framework for estimating the social cost of drug abuse. *J. Health Soc. Policy* 2: 1–22.

French, M. T., Zarkin, G. A., and Dunlap, L. J. (1996). The relationship between illicit drug use, absenteeism, and earnings at six worksites in the U.S. Working paper.

Greenwood, P. W. *et al.* (1996). *Diverting Children from a Life of Crime: Measuring Costs and Benefits*, Rand Corp., Santa Monica, CA.

Hansen, W. L. (1963). Total and private rates of return to investment in schooling. *J. Polit. Econ.* 71: 128–140.

Harrison, L., and Gfroerer, J. (1992). The intersection of drug use and criminal behavior: Results from the national household survey on drug abuse. *Crime Deling.* 38(4): 422–443.

Harwood, H. J. *et al.* (1984). *Economic Costs to Society of Alcohol and Drug Abuse and Mental Illness: 1980*, Final Report submitted to Alcohol, Drug Abuse and Mental Health Administration, Report RTI/2734/00-01FR, Research Triangle Institute, Research Triangle Park, NC.

Haveman, R. H., and Wolfe, B. L. (1984). Schooling and economic well-being: The role of nonmarket effects. *J. Hum. Resources* 19: 377–407.

Hser, Y. I., Anglin, D., and Powers, K. (1993). A 24-year follow-up of California narcotics addicts. *Arch. Gen. Psychiatry* 50: 577–584.

Kleiman, M. A., Smith, K. D., Rogers, R. A., and Cavanagh, D. P. (1988). Imprisonment-to-offense ratios. Botec Analysis Corp. Working Paper 89-06-02, Aug. 5.

Kolb, J. A., and Scheraga, J. D. (1990). Discounting the benefits and costs of environmental regulations. *J. Policy Anal. Manage.* 9: 381–390.

Kouzis, A., Eaton, W. W., and Leaf, P. J. (1995). Psychopathology and mortality in the general population. *Soc. Psychiatry Psychiatr. Epidemiol.* 30: 165–170.

Kusserow, R. P. (1990). *Crack Babies*, OEI-03-89-01540, Inspector General, U.S. Department of Health and Human Services.

Langan, P., and Graziadel, H. A. (1995). *Felony Sentences in State Courts, 1992*, NCJ-151167, Bureau of Justice Statistics, U.S. Department of Justice.

Lesser, J. A., and Zerbe, R. O. (1994). Discounting procedures for environmental (and other) projects: A comment on Kolb and Scheraga. *J. Policy Anal. Manage.* 13: 140–156.

Loeber, R., and Snyder, H. N. (1990). Rate of offending in juvenile careers: Findings of constancy and change in lambda. *Criminology* 28: 97–109.

Maguire, K., and Pastore, A. L. (eds.) (1994). *Sourcebook of Criminal Justice Statistics 1993*, Bureau of Justice Statistics, U.S. Department of Justice, USGPO, Washington, DC.

Maguire, K., and Pastore, A. L. (eds.) (1995). *Sourcebook of Criminal Justice Statistics 1994*, Bureau of Justice Statistics, U.S. Department of Justice. USGPO, Washington, DC.

Michael, R. T. (1973). Education in nonmarket production. *J. Polit. Econ.* 81: 306–327.

Miller, T. R., Cohen, M. A., and Wiersema, B. (1996). *Victim Costs and Consequences: A New Look*, National Institute of Justice Research Report NCJ-155282, Feb.

Nagin, D. S., Farrington, D. P., and Moffitt, T. E. (1995). Life-course trajectories of different types of offenders. *Criminology* 33: 111–139.

National Institute on Drug Abuse (1996). *Pregnancy & Health Survey: Drug Use Among Women Delivering Livebirths, 1992–93*, U.S. Department of Health and Human Services, Rockville, MD.

Nurco, D. N., Hanlon, T. E., and Kinlock, T. W. (1991). Recent research on the relationship between illicit drug and crime. *Behav. Sci. Law* 9(3): 221–242.

Office of Management and Budget (1992). Guidelines and discount rates for benefit–cost analysis of federal programs. Circular No. A-94. Revised Transmittal Memorandum No. 64. *Fed. Register* 57: 53519 (Nov. 10).

Office of National Drug Control Policy (1991). *What America's Users Spend on Illegal Drugs*, ONDCP Technical Paper (June).

Rajkumar, A. S., and French, M. T. (1997). Drug abuse, crime costs, and the economic benefits of treatment. *J. Quant. Criminol.* 13(3): 291–324.

Reuter, P., MacCoun. R., and Murphy, P. (1990). *Money from Crime: A Study of the Economics of Drug Dealing in Washington, DC*, Rand Corp., Santa Monica, CA.

Rice, D. P., Kelman, S., Miller, L. S., and Dunmeyer, S. (1990). *The Economic Costs of Alcohol and Drug Abuse and Mental Illness: 1985.* Report submitted to the Office of Financing and Coverage Policy of the Alcohol, Drug Abuse, and Mental Health Administration, U.S. Department of Health Administration, U.S. Department of Health and Human Services, Institute for Health & Aging, University of California, San Francisco.

Rodgers, G. B. (1993). Estimating jury compensation for pain and suffering in product liability cases involving nonfatal personal injury. *J. Forens. Econ.* 6: 251–262.

Snyder, H. N., Sickmund, M., and Poe-Yamagata, E. (1996). *Juvenile Offenders and Victims: 1996, Update on Violence,* Office of Juvenile and Delinquency Prevention, Washington, DC.

Thornberry, T. P., Huizinga, D., and Loeber, R. (1995). The prevention of serious delinquency and violence. In Howell, J. C., Krisberg, B., Hawkins, J. B., and Wilson, J. J. (eds.), *Sourcebook on Serious, Violent and Cronic Juvenile Offenders*, Sage, Thousand Oaks, CA.

Tracy, P. E., Wolfgang, M. E., and Figlio, R. M. (1990). *Delinquency Careers in Two Birth Cohorts*, Plenum Press, New York.

U.S. Chamber of Commerce (1990). *Employee Benefits 1990 Edition* (annual updates available), U.S. Chamber of Commerce, Washington, DC.

U.S. Department of Justice, Bureau of Justice Statistics (1994). *Drugs and Crime Facts, 1993*, NCJ 146246, U.S. Government Printing Office, Washington, DC.

U.S. Department of Justice, Bureau of Justice Statistics (1992). *Drugs, Crime, and the Justice System*, NCJ 133652, U.S. Government Printing Office, Washington, DC.

Viscusi, W. K. (1993). The value of risks to life and health. *J. Econ. Lit.* 31: 1912–1946.

Wright, D., Gfoerer, J., and Epstein, J. (1995). Ratio estimation of hard-core drug use. Paper presented at the Joint Statistical Meetings, Toronto, Canada, Aug. 14–15, 1994.

Zamula, W. (1987). *Social Costs of Drownings and Near-Drownings from Submersion Accidents Occurring to Children Under Five in Residential Swimming Pools*, Directorate for Economic Analysis, U.S. Consumer Product Safety Commission.