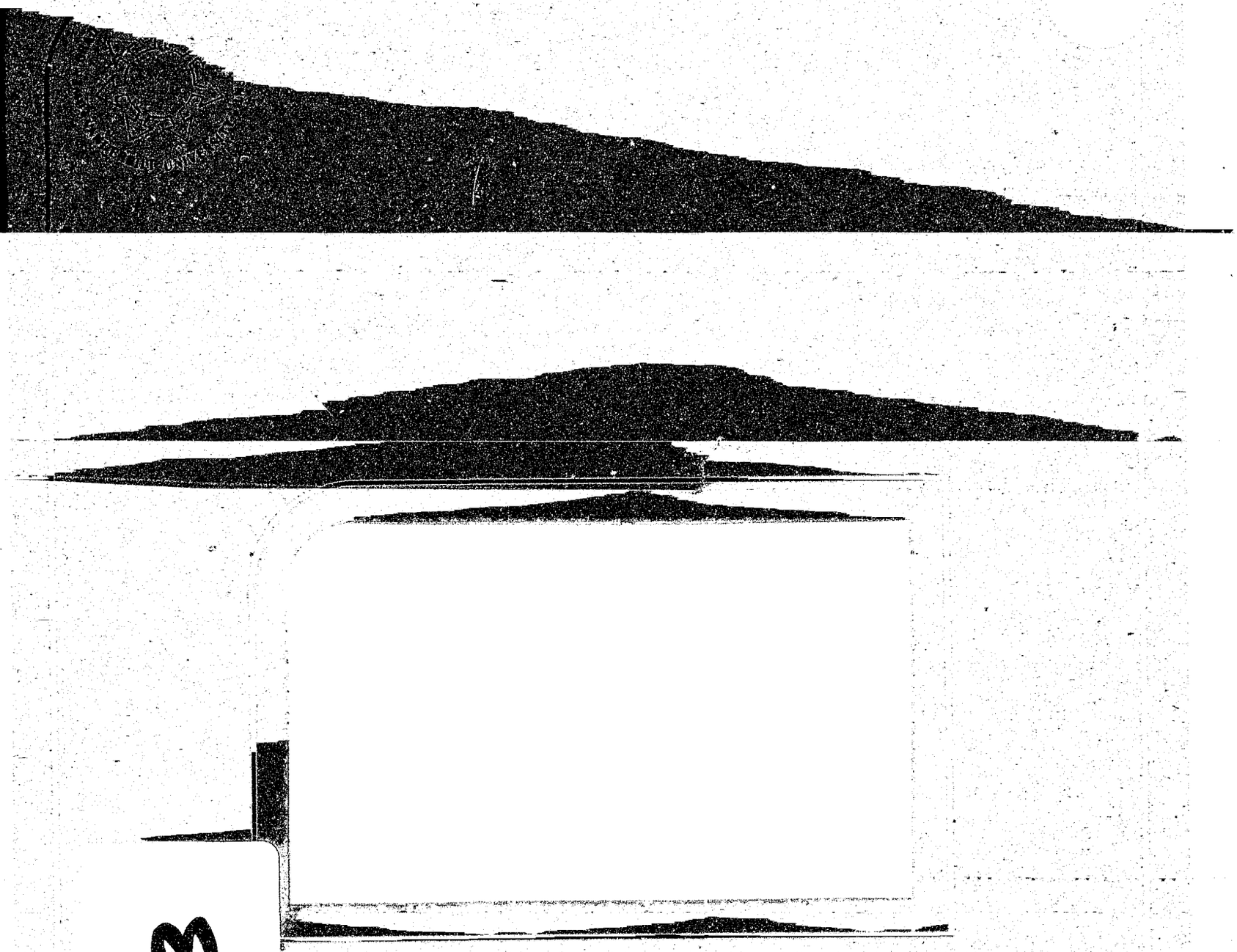

The Cost of Crime to Victims*

by

Mark A. Cohen

Owen Graduate School of Management
Vanderbilt University

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Abstract

Previous studies of the cost of crime have focused on the out-of-pocket expenses incurred by victims. This approach significantly underestimates the cost of crime to victims, by ignoring the pain, suffering and fear caused by crime. The purpose of this paper is to estimate the monetary value of pain, suffering and fear endured by crime victims. Actual victim injury rates are combined with jury awards in personal injury accident cases to estimate pain, suffering and fear. Crime-related death rates are combined with estimates of the value of life to arrive at monetary values for the risk of death. Examples of the average cost estimates for individual crimes are: $1,372 for household burglary, $12,584 for robbery, and $51,058 for rape. The aggregate annual cost of crime to victims is estimated to be $92.6 billion. These cost estimates are compared to earlier studies of the severity of crime. It is shown that rankings based on surveys underestimate the severity of violent crimes relative to crimes like petty larceny and motor vehicle theft.

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I. Introduction and Summary

Criminal activity imposes many different costs on individual victims. The out-of-pocket costs of crime include the value of stolen or destroyed property, medical costs and lost wages associated with any physical injury. The threat of injury and actual injury both impose additional costs on individual victims by causing pain, suffering and fear.1/ In the past, various studies have attempted to estimate the actual out-of-pocket costs of crime. For example, a recent study by the Bureau of Justice Statistics (BJS) estimated that in 1981, the purely out-of-pocket costs of crime to victims was $10.9 billion.2/ However, this study did not estimate the cost of pain, suffering or fear incurred by victims of crime.3/

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[1] Society's response to crime results in other indirect social costs. First, the entire criminal justice system devotes resources to apprehending, convicting and punishing criminals. Second, there is a cost to potential victims of crime who take measures to protect themselves or their property from criminal activity. Third, there is a cost to innocent individuals who are charged with committing a crime they did not commit. A related cost is the avoidance of legitimate activities because of the risk of being mischaracterized as a criminal. Criminal sanctions that are too harsh will stifle normal market transactions if there is a risk that innocent individuals will be convicted of crimes. "If, for example, the penalty for carelessly injuring someone in an automobile accident were death, people would drive too slowly, or not at all, to avoid an accidental violation or an erroneous conviction." (Posner, 1985, p. 1206).

In addition to the costs imposed on potential victims and the government, criminals may devote resources related to the cost of apprehension and conviction. For example, a criminal who is attempting to evade detection may spend money on fencing stolen goods, moving to another jurisdiction or other diversionary tactics. The cost of evasion is a social cost. Finally, some criminals who are in jail would presumably be engaged in productive work if they were not incarcerated.

[2] BJS (1984a). Another recent study of the cost of crime (Zedlewski, 1985) attempted to estimate both the cost of crime to victims and the expenditures for crime protection. Zedlewski estimated the combined cost of protection, criminal justice expenditures and victim losses to be $99.8 billion in 1983. This estimate relied upon the BJS estimate of $10.9 billion in victim losses cited above.

[3] Several authors have attempted to determine society's willingness to pay for reduced crime rates by examining property values. Conceptually, this type of approach is very similar to the present study in that its ultimate goal is to determine the social cost of crime, including a "fear" component. However, the

The purpose of this paper is to estimate the monetary value of the pain, suffering and fear endured by the victims of personal and residential crimes. The estimates in this paper are based on the actual risk of injury and death confronting victims of crime. The conversion of risks into dollar amounts is based on court awards in personal injury cases for similar injuries, and on estimates of the value of life. This section summarizes the results. Section II estimates the out-of-pocket costs of crime. Section III examines the risk of death to crime victims, and places dollar values on this risk. Section IV presents a similar analysis for injuries incurred by crime victims. The estimates derived in this paper are then compared to previous estimates of the severity of crime (Section V) and to other monetary estimates of the cost of crime to victims (Section VI). A few concluding remarks are reserved for Section VII.

Table 1 contains a summary of the monetary estimates of the harm caused by crimes covered in this paper. Each crime in Table 1 can be broken into three components: (1) direct monetary loss, (2) pain, suffering and fear of injury, and (3) risk of death.

In addition to the monetary estimates derived in this paper, Table 1 contains a comparison of these estimates with the absolute and relative ranking of the severity of crime implied by the National Survey of Crime Severity (NSCS).4/ The third column of Table 1 contains the relative ranking implied by the NSCS survey. Although these rankings differ slightly from the monetary rankings shown in this paper, the differences are slight. Violent crimes such as rape, kidnapping, and bombings are ranked as the most severe, while burglary and larceny are ranked at the bottom of the list.

However, the fourth and fifth columns of Table 1 reveal an important difference between the two rankings. In these columns, the severity rankings have been converted into absolute rankings, standardized so that a bombing is set at 100. The most striking difference between the two approaches is between violent and nonviolent crimes. For example, whereas the NSCS ranking suggests that a rape is about three times more severe than a motor vehicle theft (88 vs. 29) and six times worse than larceny (88 vs. 14), the monetary estimates imply that rape is 16 times worse than motor vehicle theft (65 vs. 4) and 325 times worse than larceny (65 vs. 0.2).

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two approaches are quite different. See Section IV for a detailed comparison of the estimates in this paper with several property value studies.

4/ A complete description of the methodology used to compare these two rankings, as well as a comparison with other public perception surveys is contained in Section V of this paper.

Table 1

The Cost of an Average Crime to Victims

Crime	Monetary Cost	NSCS Ranking	Comparison with NSCS (Bombing = 100) Monetary	NSCS
Kidnapping	$110,469	2	143	88
Bombing	77,123	1	100	100
Rape	51,058	3	66	88
Arson	33,549	4	43	75
Robbery	12,594	7	16	37
Bank Robbery	12,216	5	16	69
Assault	12,028	6	16	41
Car Theft	3,127	9	4	29
Burglary	1,372	8	2	31
Larceny		10	0.2	14
-Personal	181			
-Household	173			

The estimates shown in Table 1 have many direct policy applications. For example, one could combine these estimates with a study of recidivism to compare the costs of long term incarceration with the expected benefits due to reduced crime. Another possible application would be to use these estimates as one component in an empirically-based sentencing guideline system.5/ Finally, one could combine these estimates with the total number of each type of crime in order to determine the magnitude of the current crime problem. Such an analysis could assist policymakers in the process of allocating criminal justice resources.

5/ An optimal penalty would depend not only on the social cost of crime, but also such variables as the responsiveness of the crime rate to sanctions and the probability of capture and conviction. See Becker (1968).

Table 2 contains an estimate of the aggregate social cost of crime to victims, as well as the per capita (and per household) cost.6/ For example, the probability of becoming a robbery victim is estimated to be .0059. From Table 10, the social cost associated with robbery is $12,594. Thus, the per capita cost of robbery is estimated to be $74 ($12,594 x .0059). The estimated risk of becoming a robbery victim is based on a base population of 188.48 million.7/ Multiplying this population by the per capita cost yields an estimated aggregate cost imposed by robbery of $14.0 billion. The aggregate annual cost of crime to victims of all personal and household crimes is estimated to be $92.6 billion. This compares to the BJS direct "out-of-pocket" cost estimate of $10.9 billion.8/

It is important to note that the estimates in this paper are based on the "average" crime. Since an individual rape victim, for example, may suffer considerably more or less than average, these estimates are inappropriate for certain purposes. For example, these estimates should not be used directly for determining appropriate sanctions for different criminal actions. Instead, one would need to consider the various components in Table 1 (along with other data such as the probability of conviction and elasticity of that particular crime), so that various gradations of the crime can be sanctioned accordingly. For example, although one might want to punish all burglars for the fear they instill in victims (whether or not they actually cause any harm), an additional component of the sanction would still have to be reserved for those burglars who do cause harm. Otherwise, there is no incentive for a burglar to avoid harming his victims.

6/ These estimates (as well as most of the estimates in this paper) exclude the cost of crime to business.

7/ Source: BJS (1984b), p. 286. This is based on the U.S. population over the age of 12 in 1982. The base number of households is 85.2 million.

8/ The estimates in this paper can be divided into three categories: direct (out-of-pocket) $17.5 billion, pain and suffering $39 billion, and risk of death $36.1 billion. The $17.5 billion out-of-pocket cost is higher than the BJS estimate of $10.9 billion for two reasons. First, inflation (1981 to 1985) increases the estimate by $2 billion. The remaining $4.6 billion is due to the inclusion of lost wages and medical care for psychological injury.

Table 2

Per Capita and Aggregate Cost of Crime to Victims

Crime	Risk	Cost to Victims	Per Capita Cost	Aggregate Cost ($Billion)
Personal (per individual)				
Assault	.0247	$12,208	$297	$56.0
Robbery	.0059	$12,594	$74	$14.0
Rape*	.00095	$51.058	$49	$9.1
Larceny	.07316	$181	$13	$2.5
Household (per household)				
Burglary	.0662	$939**	$62**	$5.3
MV Theft	.01573	$3,127	$49	$4.2
Larceny	.1027	$173	$18	$1.5
Aggregate Cost of Crime				$92.6

*Note: In Table 10, the cost of burglary is estimated to be $1,372. However, all but $939 of this amount is due to the risk that the burglary will result in contact with the victim - which changes the burglary into a robbery, assault, rape, etc. Thus, to avoid double counting, the burglary estimates in this table exclude the portion of burglary costs that are associated with more severe crimes.

**This is based on the entire population. Since most rape victims are female, one might consider the risk and per capita costs to be approximately twice that shown. However, aggregate costs remain unchanged.

II. The "Out of Pocket" Monetary Cost of a Crime

The purpose of this section is to estimate the purely monetary component of the cost of crime. Table 3 estimates the "out of pocket" monetary cost of selected crimes. It includes property and theft losses, medical expenses and time lost from work by victims. The estimate excludes the monetary value of pain, suffering, fear and death. Subsequent sections will examine these other costs of crime.

Except as noted below, the personal and household crime data in Table 3 is based on the National Crime Survey.9/ The National Crime Survey excludes crimes against commercial establishments; thus, robbery and burglary are crimes against individuals and households. The survey includes both committed and attempted crimes. Thus, although the average robbery in Table 3 resulted in stolen property of $423, only 2 out of 3 attempted robberies were actually completed, so the average successful robber netted about $635.

The National Crime Survey inadequately accounts for psychological injuries. Although victims are asked about the physical injuries they incur, they are not questioned about mental health care.10/ In Section IV, estimates of the monetary values of pain and suffering due to psychological trauma are based on jury awards for the pain and suffering associated with similar psychological traumas. Based on those jury award estimates, the average medical bills for individuals who suffer from traumatic neuroses is estimated to be $4,127. For more severe disabling psychological problems, the average medical bill is estimated to be $24,750. It is further estimated that 40% of all rape victims suffer from traumatic neurosis, and 10% suffer from more severe psychological problems. About 2% of all robbery victims suffer from severe psychological injuries. Thus,

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9/ See BJS (1984a). Lost work days were estimated from BJS (1986), and valued at $18 per hour. This reflects an estimate of total wage costs (including fringe and overhead), not necessarily wages received. Estimates for other crimes are taken from FBI's Uniform Crime Reports, and other sources as mentioned below. Estimates have been updated to 1985 dollars using the Consumer Price Index; medical costs were inflated by the annual medical care price index component of the CPI.

10/ A list of survey questions can be found in the Appendix to BJS (1986).

the average mental health bill for rape victims is estimated to be $4,126. For robbery victims, the average mental health bill is estimated to be $495. These estimates have been included in the medical expense column of Table 3.

The property value loss estimates for arson are based on the average loss of incendiary and suspicious fires from 1980-1984, as reported by the National Fire Protection Association's (NFPA) annual National Fire Experience Survey and their annual compilation of civilian and fire fighter injuries and deaths in the line of duty.11/

The estimate for kidnap victims is based on the percentage of kidnap victims that are raped, robbed, assaulted, or have items stolen from them.12/ These percentages were then multiplied by the estimated costs for the respective crimes as shown earlier in Table 3.

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[11] These reports are contained in a series of articles from 1981-1985 by Karter, and Washburn, et. al.

[12] Source: Howell (1975).

Table 3

"Out of Pocket" Cost of Crime Per Incident
(Excluding Pain, Suffering, Death and Fear)

Crime	Costs				
	Medical	Property	Theft	Work	TOTAL
Personal (per victim)					
Rape	$4,344	$65	$148	$68	$4,617
Robbery	594	12	423	85	1,114
Assault	267	106	---	49	422
Larceny	---	14	158	7	179
w/contact	---	--	140	9	149
w/o contact	---	14	160	7	181
Household (per incident)					
Burglary	---	39	880	20	939
Household Larceny	--	11	153	9	173
Car Theft	---	103	2907	59	3069
Other (Per incident)					
Arson	583	13,622	479*	92	14,776
Bank Robbery	60*	**	4,042	***	4,102
Bombings	329*	24,408	---	***	24,737
Kidnapping	1,323	41	458	50	1,872

* For arson, this category includes indirect losses caused by fires, such as temporary shelter, child care, demolition expenses, etc. For bank robbery and bombings, it includes the amount of work time lost, and is based on the estimated number and severity of injuries (not on actual survey data of lost work time).

** Included in theft value.

*** Included in medical expenses.

III. The Risk of Death

One of the possible consequences of a violent crime is that the victim will be killed. The purpose of this section is to estimate the social cost of death associated with each type of crime. Although the criminal may eventually be charged with murder, this section will apportion these deaths to the underlying crime. This will allow us to estimate the "average" cost of the underlying crime, based on the risk imposed on the victim.

Economists generally agree that the proper notion to use when estimating the "value" of a statistical life is to estimate individual's willingness to pay for reductions in the risk of death.13/ Many of the studies designed to estimate the value of life are based on actual wage rate differentials in the labor market. By comparing the risk of death associated with various occupations to the wage rates paid to workers in high risk jobs, one can estimate the "risk premium" paid to workers to accept employment in an occupation that is slightly more risky than others. For example, if it is estimated that workers are compensated $500 per year for increasing their risk of death by one in 1,000, the implied "value of life" estimate is $500,000. One way to think of this calculation is that 1,000 people are willing to accept $500 each in exchange for the knowledge that one of them will die in a worker related accident. Thus, this estimate is properly thought of as a "statistical" value of life. It is not the value that any one individual would place on his or her life if faced with imminent death.

Statistical studies of the value of worker wage rates imply a value of life between $650,000 and $4 million (in 1985 dollars). The lower estimates in this range tend to be found in studies of workers engaged in highly risky occupations. Thus, one reason for the wide range of estimates may be that individuals differ in their attitudes towards risk. Individuals who are relatively more willing to accept an increased risk of death are those who will be hired for riskier jobs. Viscusi has studied labor market risk premium extensively and has concluded that a representative value of life would be $2,600,000.14/ More recently, a group of researchers at the Urban Institute (Miller, et. al., 1986) have reviewed all available estimates of the value of reductions in the risk of death, including estimates derived in other contexts such as highway safety and consumer purchases of smoke detectors and cigarettes. Despite the

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[13] For a survey of this literature, see Viscusi (1983).

[14] See Viscusi (1983), p. 106. This is based on $2 million dollars in 1980, and an approximate increase in the Consumer Price Index of 30% from 1980 to 1985.

disparate sources and types of data used, the estimates are extremely close, generally ranging from $1.0 to $2.5 million, with a mean of $1.75 million.15/ In this paper, the estimate of $2,000,000 will be used.16/

Table 4 contains estimates of the probability of death for victims of various crimes. This probability is derived by dividing the number of murders associated with each type of crime by the number of those crimes committed in 1984.17/ The last column in Table 4 - the monetary cost of death from crime - is derived by multiplying the probability of death by $2,000,000.

15/ Unlike most other authors in this area, they calculate value of life estimates based on after-tax dollars. This is the correct procedure to estimate the value of life, since workers only receive a portion of their wages as take home pay. For example, other studies may have estimated that workers are paid an extra $200 per year for an added risk of death of 1 in 10,000. This yields a value of life estimate of $2 million. However, if the worker only takes home $150 of that amount, he is really only willing to pay $150 for that reduced risk - hence the value of life should be $1.5 million. See Miller, et. al., (1986). Estimates have been adjusted to 1985 dollars using the Consumer Price Index.

16/ One might wonder why an accidental death on the job should be valued the same as a death caused by violent crime. In particular, wage rates might not only reflect the value of "life" itself, but may also take into account the pain and suffering expected to be endured between the time of the accident and the impending death. Thus, for example, if death caused by violent crime is "more painful," it might have a higher cost. Since no data is available concerning the average amount of pain and suffering endured by different victims, there is no way to account for this problem. On the other hand, as stated above, studies of other causes of death (including auto accidents, fires, and lung cancer) have shown relatively consistent valuations of life.

17/ The estimated number of crime victims is from the National Crime Survey. The number of murders resulting from each crime type was provided by the FBI, based on the Uniform Crime Report for 1984. Murders where the underlying circumstances are unknown were apportioned to each crime type based on the percentage of known murders in that crime category. Note that the estimate for assault may be too high, since all murders that the FBI classified as being the result of felony behavior and not classified in one of the other crimes in Table 4 were assumed to be assaults. This includes many murders that may have nod have been committed by strangers, such as family quarrels, fights over the proceeds of illegal narcotics income, etc.

As shown in Table 4, the probability of a victim being killed is relatively small for most violent crimes - from less than 1 in 10,000 for burglary and larceny to about 1 in 1000 for rape or robbery. These probabilities are very similar to the probability of accidental death facing workers. Thus, it may be reasonable to use the value of reduced risk of death estimates derived from low probability risks of death as a proxy for the willingness to pay to survive most violent crimes. However, the estimated probability of death for kidnapping and bombing is between 2-4 per 100 incidents. This is a much higher risk of death than that facing workers used in studies of the value of life. Since individuals likely place a higher value per reduction in risk of death as the probability of death increases, the estimates for kidnapping and bombing may be too low.18/

Note that the estimates in Table 4 are based on the objective probabilities of death. One way to think of these estimates is that society would be willing to pay $4021 per robbery to eliminate the risk of death in robberies. Alternatively, one could say that individual robbery victims would be willing to pay $4021 to guarantee they are not killed. Of course, to the extent victims believe their death is a near certainty (or higher than it really is), they might be willing to pay considerably more to avoid the risk of death.

18/ Researchers have not been successful in estimating variations in willingness to pay based on differences in risk, since individual workers tend to select jobs on the basis of their own aversion to risk. Thus, studies that have compared the implied value of life for workers in different risk categories find that workers in relatively risky occupations have lower values of life. For example, see Viscusi (1983), pp. 102-6. More recently, Smith and Desvousges (1985), attempted to elicit differences in willingness to pay according to the level of exposure to risk, by interviewing volunteers and confronting them with hypothetical risk situations. Contrary to theory, they found that individuals in their sample had higher valuations at lower levels of risk.

Table 4

Risk of Death from Crime

Crime	Probability of Death	Monetary Estimate of Risk of Death
Kidnapping	.0464	$92,800
Bombing	.0224	$44,800
Arson	.00619	12,380
Assault	.00334	6,685
Robbery	.00201	4,021
Bank Robbery	.00185	3,700
Rape	.00144	2,880
Larceny	.0000009	2
w/contact	.000034	68
Burglary	.000058	116
Car Theft	.000029	58

IV. The Cost of Pain and Suffering

The purpose of this section is to estimate the cost of pain and suffering caused by crime. Pain and suffering can result from both actual physical injury as well as from the fear of injury or death. In order to estimate pain and suffering, we need estimates of both the probability of physical and mental injury as well as dollar estimates of the pain and suffering associated with each type of injury. The first part of this section estimates the probability of physical and psychological injury caused by crime. A second section examines the rationale for using jury awards as estimates for pain and suffering. A final section describes the methodology employed to place monetary estimates on these injuries.

A. The Risk of Physical and Psychological Injury

Table 5 contains an estimate of the probability of physical injury for various violent crimes by strangers. Table 5 is based on BJS survey data from 1973-1977, (BJS, 1982). Although BJS does collect similar data for all crime victims (including those victims who knew their attackers), this data has not been published in a disaggregate form. Thus, the estimates in this paper are based solely on the injury rates caused by strangers. A comparison of aggregate injury rates, however, suggests that the chance of injury is higher when the victim knows the attacker.19/ If one were able to include injuries caused by nonstrangers, the estimated costs in this paper would be somewhat higher.

In addition, there is some evidence that the BJS survey data underestimates the true number of injuries caused by crime.20/ To the extent this is true, it suggests that the aggregate estimates in Table 2 are too low. Moreover, if this results in an underestimate of the injury rate, it also suggests that the cost per crime estimates in Table 1 are too low.21/

19/ According to BJS (1986), p. 71, the injury rate for victims who knew their attackers was 35.1%, compared to 28.1% for those who did not know their attackers.

20/ For example, see Cook (1985).

21/ Although it is unclear why the BJS survey data underestimates the number of injuries, one possibility is that those who are excluded are often offenders themselves, (see Cook, 1985, p. 100).

Table 5

Probability of Injury to Victim of Violent Crimes

Crime	Knife or Gunshot Wound	Broken Bones or Teeth	Knocked Uncon-scious or Internal Injury	Minor Injuries (Bruises, Cuts, etc.)	Other Physical Injury (Not Specified)
Rape	< 1%	2%	4%	31%	7%
Robbery	2%	2%	3%	26%	5%
Assault	4%	5%	3%	23%	5%

In addition to the crimes listed in Table 5, there are several crimes where injury information is available, but not in as detailed a format. It is estimated that on average, injuries occur in about 14% of all bank robberies,22/ 13.06% of all bombings,23/ and 7.35% of all arson cases.24/

The data in Table 5 do not include a significant injury to victims - the psychological effects of the crime not directly associated with physical injury. Unfortunately, there are no

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22/ This is based on 1975-1978 presentence investigation data compiled by INSLAW, and provided by William Rhodes. Unfortunately, this only includes federal bank robberies, which may bias the estimate upwards. On the other hand, instances where more than one individual was injured in the same bank robbery are only counted as single injuries, resulting in a downward bias.

23/ Source: FBI's Uniform Crime Reports, as cited in BJS (1984b).

24/ According to the National Fire Protection Association (Karter, 1981-1985), the probability of fire fighter injury from fire is 2.72%, and the probability of civilian injury is 2.63%. This estimate includes all types of structural fires, not just arson cases. In addition, it was estimated by Munson and Ohls (1979), p. 46, that in 12% of all residential fires, at least one family member has emotional difficulties, with 15% of these requiring professional counseling. Thus, it is estimated that 2% (.15 x .12) of all residential fire victims require professional psychological counseling.

comprehensive surveys or national studies of the incidence of psychological injury in crime victims. This exclusion is particularly important for rape. Rape Trauma Syndrome is a well established medical phenomenon that may result in severe psychological injury.25/

A study by McCahill, et. al. (1979) of 213 Philadelphia rape victims between 1972-1975 found that 30-50% of the victims had at least one of the symptoms of rape trauma syndrome immediately following their rape. In addition, 20-40% still had these symptoms one year after the rape. Williams and Holmes (1981) found that about half of 61 rape victims in San Antonio complained of similar symptoms. Other studies of rape victims found similar short-term and long-term effects.26/

Finally, a recent survey of 2,000 women in Charleston, S.C. found that rape (and attempted rape) victims suffered nervous breakdowns at a rate of over 13%, compared to about 3% for nonvictims. In comparison, robbery (and attempted robbery) victims had a nervous breakdown rate of about 5%. Assault victims were not found to have a significantly higher rate of psychological problems.27/

Based on the above studies, it is estimated that about 40% of rape victims suffer traumatic neurosis, and an additional 10% suffer from more severe psychological injuries. Robbery (and attempted robbery) victims are estimated to have a 2% rate of severe psychological injury.

25/ According to Irvin Waller, a specialist in this area, "Physical disturbances include loss of appetite, vomiting, excessive sleeping, body fatigue, crying and abuse of alcohol or other drugs. Emotional problems include mood swings, guilt, loneliness and fear. Social adjustments include missing work, sexual disruption and inability to go out." (Quotation taken from a speech by Irvin Waller, "Stress After Crime: Its Nature and Care," provided by the National Organization for Victims Assistance.)

26/ For example, Resick (1984), reports that based on several studies, 18% of rape victims show short-term signs of depression, and an additional 14% severe depression. Ellis, et. al. (1981) studied rape victims who had been assaulted at least one year earlier, and found that 22% were still in psychotherapy, with half of those being severely depressed and half moderately depressed. In the short-term, 48% had sought some form of psychiatric treatment.

27/ As reported by Berglas (1985).

B. The Use of Jury Awards as a Measure of Pain and Suffering

In order to estimate the cost of pain and suffering by crime victims, one could theoretically ask victims how much they would be willing to pay to have avoided the pain they recently endured. This would yield a monetary value of pain and suffering from those who are in the best position to estimate such a value. Unfortunately, such a survey is unlikely to elicit meaningful responses. There is no market price for pain and suffering, and people are not used to evaluating symptoms in this manner. Furthermore, the victims would have no incentive to tell interviewers the true monetary value of pain and suffering. Instead, if they believed the survey results would be used to benefit future victims (or themselves), it would be in their interest to overstate the monetary value. A similar problem exists if one attempts to determine how much individuals would be willing to pay for reductions in their risk of death. Thus, value of life studies generally rely on market wages or other data to infer individual willingness to pay.

Another method to estimate the cost of pain and suffering is to ask individuals the amount of compensation that would be required to make them accept the injury. In the case of life, this amount would be infinite. Similarly, in the case of physical harm, the willingness-to-pay approach will generally yield lower estimates than the compensation approach.28/

Willingness-to-pay studies have been conducted for non-fatal injuries. Viscusi (1983) estimates the value of the average worker related non-fatal injury to be between $26,000 and $40,000. Miller, et. al. (1986) review 13 different studies of more serious worker related injuries and estimate that the after-tax value of "lost-day" injuries (those that typically involve the loss of 15 days from work) to be from $85,000 to $105,000. Unfortunately, none of these studies are able to estimate the value of different types of injuries. Further, there is no reason to believe that the average worker-related injury is identical to the average crime-related injury.

Absent data on willingness to pay for reductions in specific crime-related injuries, the approach used in this paper will be to examine recent compensatory damage court awards for various injuries. Individuals who are injured by accidents often bring suit against the party responsible for the injury. Court awards compensate the victim for "special" damages (medical expenses and

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28/ For a comparison of these two approaches, see Cook and Graham (1977).

lost wages) and "general" damages (pain and suffering).29/

The legal theory behind compensatory damages is ostensibly "to give the injured party a sum of money which will restore him, as nearly as possible, to the position he would have been in if the wrong had not been committed; in other words, to make the plaintiff whole."30/ This theory would be difficult to implement in the case of pain and suffering awards, since it is virtually impossible for a third party to verify the amount of money that another individual would require to be made whole. Further, for many injuries, no amount of money would fully compensate some individuals for their pain and suffering. Courts have recognized this problem by reformulating the standard of compensation to be "an amount such as a reasonable person would estimate to be fair compensation," and by allowing jurors wide latitude in determining the ultimate award.31/ Moreover, instructions to juries apparently do not reflect the full compensation standard. Instead, jurors are given general instructions that permit them to award a "fair" or "reasonable" amount as compensation for pain and suffering.32/

Although drawing inferences from jury decisions is not an ideal method of determining the monetary value of pain and suffering, jury awards tend to be both predictable and stable. Furthermore, since society has chosen the civil court system as a means of redressing victims, comparing jury decisions is a logical way to approximate society's assessment of the pain and suffering incurred by victims.

The data used here to assess court awards was published by Jury Verdict Research, Inc., a private company that attempts to collect virtually all civil court awarded damages in personal injury cases in the U.S. Although we do not have access to the raw data, the company asserts that it has analyzed more than 100,000 cases and estimates of average claims can accurately predict court awards within plus or minus 7%. The data excludes out of court settlements, cases that were dismissed, and those in which zero damages were awarded.

29/ Courts often award "punitive" damages in addition to the compensatory damages studied here. Punitive damage awards are used either to punish negligent defendants or as a deterrent to prevent others from causing similar accidents. Since punitive damage awards are not meant to compensate victims for pain and suffering, they are excluded from this study.

30/ Bender, Damages in Tort Actions, 1986, Section 3.01.

31/ Ibid. See also discussion in Section 4.61 of Bender.

32/ Ibid, Section 4.61.

At first glance, this may seem like an extremely biased data source, since court awards are likely to be much higher than out of court settlements. However, the jury award data will be used here to construct an equation that allows us to estimate the pain and suffering for any level of direct medical and lost work expenses. Once this pain and suffering equation is estimated, we can use more realistic medical and lost work expenses that reflect the average injury (as opposed to the average injury in cases brought to trial), to estimate the average pain and suffering.

One problem with using civil judgments as a proxy for pain and suffering is that court awards may reflect the fact that the plaintiff will only receive a portion of the judgment, with the remainder going to the plaintiff's attorney. A recent study of civil litigation costs by Trubek, et. al. (1983) found that the average percentage of an award retained by the plaintiff is about 75%. However, the study also found that this percentage is much higher for large awards. For example, the median amount retained by the plaintiff for awards of $10,000 to $50,000 was 87.5%. If jury awards are increased to account for the attorney's share, and this effect is not factored out of the estimates, it will lead to an overestimate of the monetary value of pain and suffering.

A second problem with this approach is that most of the court cases used to estimate pain and suffering are for accidental injuries - not crime-related injuries. In particular, there may be more psychological trauma associated with a crime-induced injury. This paper does attempt to account for psychological trauma. However, trauma is estimated only for those victims who incur significant and measurable psychological injuries. Thus, if there are any systematic differences between crime related and accidental pain and suffering associated with bodily injuries, these differences will not be accounted for in this paper. To the extent crime-induced injuries result in more minor psychological trauma, the approach used in this paper will underestimate the pain and suffering caused by crime.

Finally, it is possible that cases that go to trial result in different awards than those that settle out of court. If so, the sample of cases used to estimate pain and suffering will be biased. Unfortunately, the direction and magnitude of any bias is uncertain.

Most claims are settled out of court. Out of court settlement is likely when the combined trial-related legal fees of the plaintiff and defendant exceed the difference between

their subjective evaluation of the expected judgment.33/ For example, if the two parties both believe there is a 50% chance of a court award of $500,000, they both expect a judgement of $250,000 for the plaintiff. If the plaintiff's cost of going to trial is $50,000, any proposed settlement by the defendant that is more than $200,000 is likely to be accepted.34/ However, suppose the plaintiff believes there is a 90% chance of receiving a $500,000 award and the defendant believes there is only a 50% chance of a $500,000 award. Then, the plaintiff will be unwilling to settle for less than $400,000 (90% x $500,000 minus $50,000 in legal fees). However, since the defendant expects an award of only $250,000, no settlement will result.

Models of the dispute resolution process suggest the following differences between cases settled out of court and those going to trial:

(1) Cases going to trial are those where the parties disagree as to the likely award if the plaintiff wins.35/

(2) Cases going to trial are those where the parties disagree as to the probability of the plaintiff winning.

(3) Cases in which the degree of negligence is in doubt will result in lower awards or settlements.

(4) Cases settled out of court tend to involve smaller monetary amounts on average than cases that go to trial, because litigation is costly.

(5) Out of court settlements for the same identical injury should be smaller to account for the savings in litigation costs incurred by the plaintiff.

(6) Out of court settlements for the same identical injury should be smaller to account for the possibility that the defendant would win in a trial. For example, if the plaintiff has a 90% chance of winning in court, he would be willing to settle for 90% of the expected award if he won in court.

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33 For a discussion of this result, see Shavell (1982).

34 This example assumes that both individuals are risk neutral.

35 However, to the extent that one or both parties are risk averse, there is an incentive for out-of-court settlements, even if the parties disagree on the likely outcome. This also applies to item (2) below. See Gould (1973).

The first two implications are unlikely to bias the sample of cases in any systematic manner. Instead, cases that go to court may have more variance in their settlement outcomes, and tend to be more precedent-setting cases. However, the second and third implications combined suggest that cases that go to trial may be those in which the degree of negligence is uncertain. If this is true, court awards would tend to be smaller. However, the last three implications all argue that court awards will be larger than out of court settlements.

Unfortunately, there is very little empirical evidence on out of court settlements versus trial awards. A study of personal injury cases in the late 1950's found that although the average settlement for accidents in which the injured parties did not bring suit was lower than those in which parties sued, "the value of a case will not be substantially increased solely by the act of suing or going to trial. The observed relationship is probably due to the fact that potentially larger cases are more resistant to settlement, that is, more likely to go to suit and trial....In fact, recovery in cases that went to verdict averaged 16 per cent less than in cases settled during trial."36/

A more recent study of medical malpractice claims found that although the average verdict was $102,000 compared to $26,000 for cases settled out of court, "the fact that cases going to verdict typically involve much larger stakes accounts for over three times as much of the explained discrepancy between mean verdict and mean settlement as the tendency of cases to settle for less than their potential verdict."37/

Based on the little empirical evidence that is available, the average court award for a particular type and severity of injury may be a good proxy for the pain and suffering for similar injuries. However, the average court award for a particular type of accident or type of injury (regardless of severity) may not be a good proxy for the average pain and suffering for similar accidents or injury types. For example, the average court award for broken arms may be higher than the average pain and suffering endured by broken arm victims, because those plaintiffs who go to trial tend have the most severe cases of broken arms. However, one can estimate a functional relationship between the cost of medical care for broken arms and pain and suffering awards in these cases. By applying the average medical costs for all broken arms to the estimated pain and suffering equation, one can ignore the average court award and instead estimate the average pain and suffering for all broken arms. That is the procedure used in the next section of this paper.

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36 Franklin, et. al. (1961), p. 19.

37 Danzon and Lillard (1983), p. 370.

C. Methodology for Estimating Pain & Suffering from Jury Awards

In order to describe the methodology used to estimate the monetary value of pain and suffering, a description of the computations for gunshot wound follows. Table 6 shows the average compensatory award for gunshot wound victims by the amount of medical costs and lost wages incurred. Column 1 indicates the range of medical cost and lost wages, with column 2 providing the midpoint of that range. Column 3 shows the average award. Column 4 shows the average "pain and suffering" component of the award, which is simply column 3 minus column 2. Thus, if a gunshot victim incurs between $2,000 and $4,999 in medical costs and lost wages, the average compensation is $48,183. After deducting the average medical costs and lost wages of $3,500, the pain and suffering component is $44,683.

From Table 6, one can estimate a regression equation that relates medical costs and lost wages to pain and suffering awards:

$ Pain and Suffering = $17,957 + {$5.20 x $(Medical + Wage)}[88]

Thus, if a gunshot wound results in $1,000 of medical costs and lost wages, the estimated pain and suffering award is $23,157 [$17,957 + ($5.20 x $1,000) = $23,157]. Further, each additional dollar of medical costs and lost wages results in an additional $5.20 in pain and suffering.

Ideally, one would like to know the average medical cost and lost wages associated with crime victims who suffer from each type of injury. One way to estimate average costs would be to combine information about the distribution of injuries (i.e. where the injury occurs on the body and the severity of the injury) with estimates of the cost of treatment. Unfortunately, data on the distribution of crime-related injuries is not available. Instead, estimates are available of the distribution of injuries that occur in consumer product related accidents. This data was obtained from the Consumer Product Safety

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[88] Note that this regression equation results in an adjusted R-squared close to 1, since this procedure is simply reconstructing the regression equations apparently estimated by Jury Verdict Research, Inc. Similarly, the t-statistic on the independent variable (direct costs) is very high.

Table 6

Estimate of Pain and Suffering for Gunshot Wounds
(1982 Award Dollars)

Medical Costs and Lost Wages	Midpoint of Medical & Wages	Average Total Award	Average Pain and Suffering Award
$0 - $1,999	$1,000	$19,216	$18,216
$2,000-$4,999	$3,500	$48,183	$44,683
$5,000-$9,999	$7,500	$65,798	$58,298
$10,000-$15,999	$13,000	$89,024	$76,024
$16,000-$22,999	$19,500	$143,309	$123,809

Commission (CPSC).39/ Their data base contains over 10 million actual consumer product related injuries as reported by 74 different hospital emergency rooms throughout the country.

In addition to the distribution of accident-related injuries, injury-specific estimates of medical costs are available from insurance claims at the Civilian Health and Medical Program for the Uniformed Services (CHAMPUS) of the Department of Defense.40/ Cost estimates were obtained for fractures, burns, concussions, contusions and abrasions, puncture wounds (knives), and foreign bodies (gunshot wounds). These estimates are body part specific. For example, we know the average cost for fractured shoulders, fingers, wrist, legs, etc. They also indicate whether inpatient hospital treatment was necessary.

Based on these two data sources, one can estimate the average medical costs for broad categories of injuries, such as

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39/ The model is fully described in "The Consumer Product Safety Commission Injury Cost Model: Complete Documentation," July 18, 1980, authored by Technology and Economics, Inc.

40/ These estimates were provided by CPSC. They use this data in their injury cost model.

gunshot wounds, broken bones or internal injuries. However, there is no reason to believe that the distribution of consumer product related injuries is the same as crime related injuries. Thus, data on the percent of injured crime victims who are treated as inpatients versus those who are treated and released as outpatients was used in place of the corresponding estimates for consumer products.41/ Further, several checks of the data suggested that changes in the distribution of injuries by body part do not greatly affect the estimates of average medical costs.42/ A similar analysis was conducted for lost wages due to injuries.43/

Based on the regression equation above, one can estimate the average pain and suffering caused by gunshot wounds, as follows:44/ The average outpatient expense is estimated to be $434, with the corresponding pain and suffering estimated to be $33,001. The average inpatient expense is estimated to be $6,118, with pain and suffering $76,926. Based on an estimated 40% outpatient and 60% inpatient ratio, the average medical cost

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41/ According to data from BJS, approximately 60% of crime victims who require hospital treatment are treated on an inpatient basis. The corresponding figure for consumer products is only about 5%.

42/ For example, an analysis of the CHAMPUS data reveals that within a specific injury category, the average costs do not vary significantly between the various body parts. Moreover, the estimated costs using this technique tend to be close to the unweighted average of the CHAMPUS data. The average cost for a contusion (for example) ranges from $685 for an arm, wrist, elbow or hand to $2516 for the face, head, eye, mouth or neck. The weighted average based on consumer product injuries is estimated to be $1,422.

43/ Data from the National Health Interview Survey that estimates the average number of days of work lost by diagnosis, was provided by CPSC. This was combined with CPSC and BJS data to estimate average lost wages for crime-related injuries.

44/ Although CPSC data contains information about many types of injury, such as fractures, contusions, burns and internal injuries, there is no category that directly compares with gunshot wounds. The closest category is that of embedded foreign objects, which presumably are not as dangerous (on average) as bullets. The CPSC estimates of outpatient expenses for foreign object injuries is used. However, the estimate for injuries resulting in inpatient care are based on a sample of actual hospital gunshot wound cases in 1982. This information was provided in private correspondence by Philip J. Cook.

and lost wages is $3,844 and pain and suffering $59,355. Using the same methodology, estimates were derived for other types of injuries, and are listed in Table 7. The estimates in Table 7 have been updated to 1985 award dollars.45/

Pain and suffering may also result from non-physical injuries. In particular, the fear of injury or death may cause mental anguish and distress. In some states, courts recognize the mental anguish associated with the fear of injury and death as a compensable damage in negligence cases. Although Jury Verdict Research, Inc. does not categorize jury awards in this manner, another source of information on personal injury awards is available - a 13 year compilation of all pain and suffering awards in the Louisiana appellate courts.46/ Of the several thousand cases listed, only 10 involved payment for incidents where there was no physical injury and no evidence of psychological injury other than some transitory "fear." Although this is an extremely small sample, it does encompass the entire population of appellate court cases in Louisiana over this period of time. Moreover, the situations involved in these cases fairly closely resemble fear of injury in crime situations.

These 10 cases have been divided into two groups. The first group consists of two cases where gunshots were fired, one case of a boat sinking where the plaintiff feared imminent drowning, and one boating incident that almost resulted in the decapitation of the plaintiff. These cases were grouped together since they appear to be instances where the individual was in imminent danger of severe injury or death. The awards (in 1985 dollars) ranged from $2,820 to $9,712, with the average award being $4,398. According to Jury Verdict Research, Inc., Louisiana court awards are 3% below the national average. Thus, the estimated award for fear was inflated by 3%, to $4,535. This group has been labeled "fear when weapon is present," in Table 7.

The "no weapon" group consists of four auto accidents in

45/ As stated above, average medical costs for physical injuries are estimated from CHAMPUS data. However, no corresponding estimates are available for psychological injury. Instead, the average medical costs for psychological injury are based on the average medical expense in jury award cases. By definition, none of these psychological injuries are minor, and the estimated probability of injury used in this paper includes only severe cases. Moreover, the estimates appear reasonable. For example, at $80 per hour for psychiatric care, they imply that the average patient suffering from a traumatic neurosis requires 52 visits, and a patient suffering from a severely disabling injury requires 310 visits.

46/ See "A Quantum Study..." (1986).

which there was no actual injury, and two cases of trespass on a residential property that led to a fear of becoming a crime victim.47/ Based on the awards in these cases, the average injury is estimated to be $2,240.

Based on the above estimates, it is possible to estimate the "average" pain and suffering caused by each type of crime. This is done by combining the information contained in Tables 5 and 7 in addition to the estimates of psychological injury described in the text above. In particular, the "average" pain and suffering for a crime is simply the fraction of victims who incur each type injury, multiplied by the respective pain and suffering estimate. Table 8 illustrates how this calculation is done for the crime of rape. It is estimated that the average rape (or attempted rape) victim incurs $43,561 in pain and suffering.48/ Fear is counted only for those victims who suffer no other physical or mental injury, estimated to be 5.5% of all victims. Presumably, jury awards for pain and suffering when actual injury occurs, already account for fear. Using this methodology, estimates for the pain and suffering for other crimes are listed in Table 9.

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47 Admittedly, the two groups are somewhat arbitrary and based on very limited information. For example, one could argue that auto accidents are not at all like crimes, or that they should be included in the "weapons" category. However, it was felt that most auto accidents where no injury was involved are not likely to be very bad accidents. Moreover, the awards in these cases were generally less than those in trespass cases. Furthermore, it should be noted that the inclusion of these "fear" estimates does not significantly alter the main results in this paper - either the relative rankings or the absolute monetary estimates.

48 One of the potential problems with Table 7 is double counting. For example, most of the rape victims who suffered psychological trauma probably also experienced some physical injury. To the extent jury awards for gunshot wounds (for example) include an evaluation of long term psychological effects, there is some overlap between these two categories, and the actual pain and suffering estimate should be lower. However, most jury awards are for accidental injuries, not violent crimes. Psychological injury is probably less frequent in accidents. Furthermore, the estimate of jury awards for psychological injury specifically excludes cases in which significant physical injury also occurs. In addition, it is possible that the presence of both physical and psychological injury may compound the pain and suffering, so that instead of double counting, this problem results in an underestimate of damages for those who are injured in both ways. Finally, this double counting problem is less likely for other crimes where we have not included a separate estimate of psychological trauma.

Table 7

Medical Costs, Lost Wages and Pain and Suffering Estimates for Various Injuries
(1985 Award Dollars)

Injury	Average Medical & Lost Wages	Average Pain & Suffering
Severely Disabling Psychiatric Injury	24,750	97,556
Traumatic Neurosis	4,127	76,514
Gunshot Wound	3,844	59,344
Burns	1,750	40,541
Internal Injuries or Concussion*	2,553	23,366
Broken Bones or Teeth**	1,700	15,273
Multiple Minor Injuries (Cuts, Bruises, etc.)	1,168	3,318
Fear with weapon present	--	4,535
Fear without weapon	--	2,240

*This estimate was derived from a composite of court awards in cases resulting in damage to the heart, lungs, spleen, bladder, liver, gallbladder and kidneys, as well as injuries resulting in simple concussions and concussions resulting in residual effects.

**This estimate was derived from a composite of court awards for injuries to the teeth, forearms and lower legs.

Table 8

Pain and Suffering Endured by Rape Victims

Injury	Probability	Pain & Suffering	Total
Traumatic Neurosis	.40	76,514	30,606
Severe Psychiatric	.10	97,556	9,756
Minor Injuries	.31	3,318	1,029
Internal/Unconscious	.04	23,366	935
Broken Bones/Teeth	.02	15,273	305
Gunshot/Knife	.005	59,344	297
Other*	.07	6,825	478
Fear (not otherwise injured)	.055	2,825	155
Average Pain and Suffering			$43,561

*Note: The pain and suffering estimate for other injuries is estimated to be a composite of other physical injuries, weighted by their incidence in rape cases.

Table 9

Pain and Suffering in Violent Crimes

Crime	Estimated Monetary Value of Pain and Suffering
Rape	$43,561
Kidnapping	15,797*
Robbery	7,459
Bank Robbery	4,414
Arson	6,393**
Bombing	7,586***
Assault	4,921
Burglary	317****

*The estimate for kidnapping is based solely on the probability that kidnap victims will also be raped, assaulted or robbed, and is multiplied by their respective pain and suffering estimates. Source: Howell (1975).

**Firefighter injuries are based on the actual distribution of injuries, as reported by the National Fire Prevention Association. No data is available on the distribution of injuries for civilians. Instead, it was assumed that all civilian injuries are burns. In addition, it was assumed that traumatic neurosis occurs in 2% of all arson fires. (See footnote 24).

*** No data available on the distribution of injuries. Instead, it was assumed that injuries are evenly distributed between minor, internal injuries and gunshot-type injuries.

****This is based on 8.9% of burglaries that occur when a household member is present, but not resulting in a violent crime; plus 3.8% of burglaries that result in a violent crime, times the fear associated with each type of violent crime.

Based on the individual components of cost in the previous two sections, one can derive an overall estimate of the cost of each type of crime covered in this paper. Table 10 contains such an estimate.

Table 10

The Social Cost of an Average Crime

Crime	Direct Losses	Pain & Suffering	Risk of Death	TOTAL
Kidnapping	$1,872	$15,797	$ 92,800	$110,469
Bombing	24,737	7,586	44,800	77,123
Rape	4,617	43,561	2,880	51,058
Arson	14,776	6,393	12,380	33,549
Robbery	1,114	7,459	4,021	12,594
Bank Robbery	4,102	4,414	3,700	12,216
Assault	422	4,921	6,685	12,028
Car Theft	3,069	--	58	3,127
Burglary	939	317	116	1,372
Larceny				
-Personal	179	--	2	181
-Household	173	--	--	173

V. Comparison with Public Perceptions of Severity

This section will compare the severity of crimes implied by the monetary estimates in Table 10, with other efforts to rank the severity of crimes. The most comprehensive crime severity study is based on the National Survey of Crime Severity (NSCS), conducted in 1977.[49] This survey asked individuals to rank the seriousness of different crimes. By having respondents compare each crime to a standardized crime with a given rank of 10, the survey not only allows one to numerically rank crimes, but it also yields weighted rankings. Thus, it is possible to infer that crime X is twice as serious as crime Y.

The NSCS listed 204 different crimes. However, many of these different entries were actually different outcomes of the same criminal event. Thus, in order to compare the NSCS severity rankings to the monetary rankings derived in this paper, an "average" crime must be constructed. This is done by weighting each different outcome within a crime type by its frequency of occurrence.

For example, NSCS listed 24 different robberies, with the components varying by whether or not the robbery was completed and the extent of injury (or death) to the victim (if any). The NSCS score for robberies ranged from a low of 3.3 for an unsuccessful attempt to a high of 43.2 for a robbery that resulted in death to the victim. Before estimating the average robbery, it was necessary to characterize the NSCS score by the components of robbery. Thus, a regression equation was estimated, where the dependent variable was the NSCS score, and the independent variables were (1) the amount of money stolen, (2) whether or not injury occurred, (3) whether or not hospitalization was necessary, and (4) whether or not death occurred.[50] The resulting estimation equation was:[51]

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[49] See Wolfgang, et. al. (1985).

[50] The latter three variables were specified to be 0-1 dummies, where 0=no and 1=yes. Thus, if the robbery resulted in a minor injury, the last three variables would be 1,0,0; if hospitalization was necessary, they would be scored 1,1,0; whereas if death occurred, they would be scored 1,1,1. Note that it was assumed hospitalization occurred in all cases of death.

[51] t-statistics are in parentheses. The adjusted R-squared for this equation was .88.

$$\text{NSCS Score} = 5.90 + \underset{(3.50)}{.0041\ (\text{Dollars})} + \underset{(2.85)}{3.85\ (\text{Injury})} + \underset{(3.03)}{4.71\ (\text{Hospital})} + \underset{(9.37)}{28.74\ (\text{Death})}$$

To arrive at an average NSCS Score, the above equation was evaluated at the mean value of the independent variables, as estimated in this paper. Thus, from Table 3, the average robbery involved loss or destruction of $435 in property. From Table 5, it was estimated that approximately 38% of all robbery victims received some injury, while about 9% received injuries serious enough to warrant hospitalization. Finally, from Table 4, it was estimated that 0.201% of all robbery victims are killed. Using these estimates along with the regression equation above, the average NSCS Score for robbery is estimated to be:

$$\text{NSCS Score (Robbery)} = 5.90 + .0041\ (435) + 3.85\ (.38) + 4.71\ (.09) + 28.74\ (.00201) = 9.6$$

This procedure was replicated for all other crimes where multiple criminal events were listed in the survey. Table 11 lists the average NSCS scores for crimes that were listed in Table 10, along with the rankings implied by the NSCS score and those implied by the monetary values estimated in this paper.

Table 11 also lists the rankings of two other surveys of public severity perceptions. Both the Rossi (1974) and Cullen (1982) surveys asked people to rank the seriousness of 140 crimes on a scale of 1 to 9. Unlike the NSCS survey, the Rossi and Cullen surveys did not specify the amount of money taken or the extent of injury. Instead, these surveys concentrated on the victim type - e.g. policeman, former spouse, stranger. Thus, in cases where there were more than one listing of the same crime, the average ranking is reported. The Rossi and Cullen surveys did not include bombings. Since NSCS ranks a bombing incident as the most serious crime, the rankings reported in Table 11 for Rossi and Cullen start with a ranking of 2 as the most serious.

Table 11

Comparison of NSCS Rankings to Monetary Rankings

Crime	Average NSCS Score	NSCS Ranking	Monetary Ranking	Rossi	Cullen
Bombing	25.7	1	2	-	-
Kidnapping	22.8	2	1	3	5
Rape	22.6	3	3	4	4
Arson	19.2	4	4	5	2
Bank Robbery	17.7	5	6	2	3
Assault	10.6	6	7	7	6
Robbery	9.6	7	5	6	7
Burglary	8.1	8	9	8	8
MV Theft	7.4	9	8	9	9
Larceny	3.6	10	10	10	10

As shown in Table 11, the NSCS rankings are remarkably similar to those derived in this paper. Although the rankings differ in a few cases, the NSCS scores for these different pairs are relatively close together (22.8 versus 25.7 for kidnapping and bombing; 8.1 versus 7.4 for burglary and motor vehicle theft). The Rossi and Cullen rankings are also generally consistent with the other methods.

Although the numerical rankings derived from these different approaches appear to be quite similar, a somewhat different result is evident if one compares the absolute rankings of each crime. This is done in Table 12. The second and third columns of Table 12 compare the severity of crimes implied by the NSCS severity numbers in Table 11 and the monetary costs estimated in Table 10.52/ To compare the two estimates, the value of larceny

52/ This comparison could not be done for the Rossi and Cullen estimates, as their survey approach did not solicit information concerning the absolute rankings for each type of crime. In the Rossi and Cullen surveys, respondents were constrained to rank seriousness on a scale of 1-9. However, the

has been standardized to equal 1. Thus, according to the NSCS severity rating, rape is about 6 times as severe as larceny; whereas the monetary approach developed in this paper ranks rape almost 300 times more severe.

The fourth and fifth columns of Table 12 show the same comparisons when crimes are put on a scale of 0 to 100, with 100 being equal to a bombing. According to this comparison, the two methods yield similar results for violent crimes. However, the NSCS ranking places much higher values on the nonviolent crimes of burglary, motor vehicle theft and larceny.

Table 12

Absolute Severity of Crime

Crime	Larceny = 1		Bombing = 100	
	NSCS	Monetary	NSCS	Monetary
Bombing	7.1	435.7	100	100
Kidnapping	6.3	624.1	88	143
Rape	6.3	298.6	88	66
Arson	5.3	189.5	75	43
Bank Robbery	4.9	69.0	69	16
Assault	2.9	69.5	41	16
Robbery	2.7	72.8	37	16
Burglary	2.2	7.9	31	2
MV Theft	2.1	18.1	29	4
Larceny	1.0	1.0	14	0.2

NSCS respondents were asked to take into account the absolute rankings. For example, they might have been told to use the standard that stealing a bicycle is worth a rating of 10. Then, if they believed armed robbery of $100 was three times more severe than stealing a bicycle, they would rate that crime at 30.

VI. Comparison with other Estimates of Monetary Value

This section will compare the estimates derived in this paper with other sources of the monetary value of injury and death. In particular, the estimates will be compared with (1) jury awards in wrongful death cases, (2) studies of worker's willingness to pay to avoid work-related injuries, and (3) property value studies designed to elicit willingness-to-pay estimates for reductions in the crime rate.53/

Since much of the data in this paper is based on jury awards for pain and suffering, one may want to look at jury awards in wrongful death cases. According to Jury Verdict Research, Inc., the average award for wrongful death of an adult is approximately $600,000 in 1985 dollars.54/ This is considerably lower than the $2,000,000 value of life estimate used in this paper. This is not surprising, since compensation in wrongful death cases is based on a concept that is entirely different from either the "willingness to pay" or the "compensation" approaches discussed earlier.

Since court awards in wrongful death cases are based solely on pecuniary losses (plus pain and suffering prior to death), it is not surprising that these awards tend to be less than estimates of the value of life based on willingness to pay.55/ Furthermore, these net earnings estimates are discounted to present values.

First of all, individuals are generally risk averse, which

53/ The author is aware on one other study that attempted to estimate the monetary cost of individual crimes. Phillips and Votey (1981) used a few independent observations on crime costs to estimate a log-linear relationship between dollars and survey-based seriousness scores. However, because most of the independent estimates of crime costs were based solely on actual out-of-pocket losses, their estimates do not adequately account for the risk of injury and death for most crimes.

54/ Actually, the dollar award estimates have been updated to reflect the estimated 1985 personal injury dollar awards. This procedure has been used throughout this section.

55/ "The courts have resolved the vexing problem of the proper valuation of life by ignoring it. Damages in a death case are generally limited to compensating the pecuniary loss to survivors... plus any medical expenses, plus any pain and suffering sustained by the victim before death. The loss-to-survivors measure is lost earnings, net of the victim's living expenses." Posner (1977), p. 150.

means that they are willing to pay a premium over the expected value of their reduction in risk of death. Secondly, since individuals value leisure activities, any award based solely on pecuniary losses must understate the value of life.

In addition to value of life estimates, several studies have attempted to estimate the value of injuries and crime from a willingness-to-pay criteria. The worker injury studies were cited in Section IV(B), with values estimated to be between $26-40,000 for the average nonfatal injury, and between $85-105,000 for more severe nonfatal worker injuries. Although there is no systematic way to compare these estimates with those in this paper, these wage rate estimates are not much different from the average pain and suffering estimates for injuries shown in Table 7.

Several authors have attempted to determine society's willingness to pay for reduced crime rates by examining property values. Thaler (1978) attempted to do this by examining housing prices in Rochester, N.Y. in 1971. By comparing prices for similar houses in areas that have different crime rates, he was able to infer housing buyers' willingness to pay for lower crime rates. Based on this approach, he estimated that the value of the average property crime (burglary, larceny and auto theft) was $535 in 1971. In 1985 dollars, this would be approximately $1,616. In arriving at this estimate, Thaler divided the estimated crime component of property value by the number of reported crimes. However, since only a fraction of all crimes are reported to police, this results in an overestimate of the cost of each crime.56/ Thus, adjusting Thaler's estimate to reflect the actual crime rate, yields an estimated cost per property crime of $622.57/ Two similar studies of housing values in Boston and Chicago found that the value of the average index crime (property plus violent crime such as rape, robbery and assault) was $3,355 and $7,366 respectively (in 1985 dollars).58/ Adjusting for the actual number of crimes yields

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56/ This is based on the assumption that property values reflect the actual crime rate in the neighborhood instead of the number of crimes reported to police.

57/ This is based on the BJS survey which reports that only 38.5% of all property crimes were reported to police in 1984.

58/ The Boston study was conducted by Hellman and Naroff (1979) The estimate of $3,355 has been derived from their paper as follows: According to equation (27), a 1% reduction in the crime rate results in a 0.63% increase in property values. The city of Boston had a total property value of $1,518,212,000. Thus, a 0.63% increase is $9,564,735. According to the FBI's Uniform Crime Reports, the average number of index crimes in

cost estimates of $1,177 and $2,285 respectively.59/

Although conceptually an interesting approach to determine the market value of crime, these property value studies have many limitations and biases. First, they are unable to disentangle the cost of each particular type of crime. Instead, they can only be used to value a composite crime index. Second, none of these studies has adequately controlled for other confounding factors. The existence of confounding factors may overstate the willingness to pay for reductions in crime. For example, high crime neighborhoods may also be neighborhoods that suffer from air or noise pollution. Since the level of pollution is not controlled for in these studies, part of the estimated benefit of reduction in crime may actually be the value of lower pollution levels. Other variables that may also be highly correlated with crime rates (and thus imply that the property value approach overvalues crime) include proximity to fire stations, quality of schools, and other amenities.

Finally, there is one factor that tends to make these estimates too low. Individuals who are less risk averse, and less sensitive to crime rates, will tend to live in higher crime areas than individuals who place a higher value on safety. Thus, the market price for crime as determined by property values is biased downward due to individual's self-selecting into their preferred crime/property value combination.

One way to check on the reasonableness of the estimates derived in this paper is to estimate the "value" of the "average" index crime. These estimates can then be compared directly with those obtained by the property value approach. Tables 13 and 14 attempt to compare these two different estimates. In Table 13, the monetary value (based on Table 10) of each crime in the FBI crime index is multiplied by that crime's contribution to the total number of crimes reported to police in 1983. For example, rape accounted for 0.65% of all crimes. Multiplying .0065 by the social cost of rape ($51,058), yields $334. This is the amount

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Boston between 1972 and 1974 was 53,854. Thus, a 1% decrease in the crime rate would represent about 538 crimes. Dividing $9,564,735 by 538 yields a total property value increase per crime of $17,778. However, following Thaler, it is assumed that this represents the capitalized value of a 1% reduction in crime per year. Assuming a discount rate of 10% and an infinite housing life yields a cost per crime of $1,778, or $3,355 in 1985 dollars. The Chicago study was conducted by Rizzo (1979). The estimate is taken directly from Rizzo's study, updated to 1985 dollars.

59/ This is based on the BJS survey estimate that 35.1% of all crimes were reported to police in 1984.

that rape adds to the "average" crime in the crime index. Summing up the values for each type crime yields $2,210. This is the estimated cost of the "average" crime, based on the FBI crime index for 1983. This compares to Rizzo's estimate for the cost of index crimes in Chicago of $2,585, and to Hellman and Naroff's estimate for Boston of $1,177.

Table 13

Average Cost of FBI Index Crime

Crime*	Number (1983)	Fraction of Total	Social Cost (Table 10)	Contribution to "Average" Crime
Rape	78,920	.0065	51,058	334
Assault	639,530	.0531	12,028	636
Robbery	500,220	.0415	12,594	523
Burglary	3,120,800	.2590	1,372	355
Larceny	6,707,000	.5566	180	100
MV Theft	1,004,400	.0833	3,127	260
	12,050,870			$2,210

*Note: Murder is included in the FBI index. However, since the cost estimates for all crimes in this paper include murders, it would be double counting to include murders here.

Table 14 reports an identical analysis for property crimes only. The result is that the average property crime costs society an estimated $857, compared to Thaler's estimate of $622 for Rochester.

Table 14

Average Cost of Property Crime

Crime	Number (1983)	Fraction of Total	Social Cost (Table 10)	Contribution to "Average" Crime
Burglary	3,120,800	.314	$1,340	$ 421
Larceny	6,707,000	.676	180	122
MV Theft	1,004,400	.101	3,111	314
	9,928,200	1.0		$857

Another possible method to estimate the pain, suffering and fear incurred by a kidnap victim is to examine jury awards for pain and suffering in wrongful death cases. Juries routinely award higher amounts in wrongful death cases where the victim suffered prior to death. Table 15 estimates the average pain, suffering and fear in a kidnap case based on jury awards for wrongful death cases. The second column in Table 15 is the percent above average wrongful death awards that juries award for different time periods of victim suffering prior to death. For example, if the person who died suffered for 1-7 days, the average jury award is 29% above the average award in a wrongful death case where there was no victim suffering. The third column estimates what the actual dollar award for pain and suffering is for each time period, based on the $600,000 average award for death cases.60/ Thus, a 29% increased award represents an additional $108,000. The fourth column is an estimate of the percentage of kidnappings that actually last that time period. Thus, an estimated 12.2% of all kidnappings last 1-7 days. In order to estimate the award for the "average" kidnapping, the third and fourth columns are multiplied by each other and summed. This is shown in the fifth column. The result of this exercise - $128,424 - is very close to the estimate of $110,469 used in Table 10.

60/ See the beginning of this section for a discussion of wrongful death awards and a comparison with the willingness to pay approach to valuing life.

Table 15

Average Pain, Suffering and Fear in Kidnap Cases
Based on Wrongful Death Cases

Days of Suffering	Percent Above Wrongful Death	"Cost" of Kidnap Based on Percent of Death Award	Percent of Kidnappings of this Length of Time	Average Pain, Suffering and Fear
< 1 Day	18%	$108,000	78.0%	$84,240
1-7 Days	29%	$174,000	17.2%	29,928
1-30 Days	33%	$198,000	3.2%	6,336
1-6 Months	80%	$480,000	0.8%	3,840
> Six Months	85%	$510,000	0.8%	4,080
		Average Pain, Suffering & Fear		$128,424

VII. Concluding Remarks

This paper has served two main purposes. First, it has provided concrete estimates of the social cost of individual crimes against persons and property. Second, and more importantly, this paper has demonstrated that the social costs of crime can be estimated by combining a wide range of information on actual probabilities of injury and death, studies of the value of life, and jury awards for pain and suffering in personal injury cases. Further empirical studies will no doubt find that some of the estimates in this paper can be improved upon. It is hoped that the methodology developed here will encourage others to refine these estimates.

Throughout this paper, many assumptions have been made where data limitations precluded more precise estimates. In an attempt to test the sensitivity of the estimates in Table 10 in relation to these assumptions, several tests were conducted. In general, this analysis suggests a high degree of confidence in the relative severity rankings of crime developed here. Moreover, except for large changes in the value of life, the absolute dollar estimates are relatively stable.

For example, the value of life used in this paper is $2,000,000, while estimates range from $650,000 to $4 million. Although the specific dollar estimates in Table 10 are quite sensitive to large changes in the value of life, the relative ranking of crimes remain virtually unchanged throughout this entire range. In fact, from $1-4 million, the only change is in the relative ranking of assaults. As the value of life increases, assaults have higher estimates than bank robbery; and as its value decreases, assaults become less severe than robberies. This is not surprising, since assaults have a very high death rate (see text). Further, as the value of life estimate approaches $650,000, rape becomes more severe than kidnapping and bombing. This is due to the fact that the predominant cost of rape is the psychological injury - not the risk of death.

Another sensitivity analysis was conducted for those crimes where estimates of psychological injury was included, since these estimates are much less reliable than those for physical injury. In all cases, increasing or decreasing the estimated psychological injury rate by 25% had no effect on the relative rankings. Minor changes were noted when the psychological injury rate was changed by 50%.

Several gaps in the data should be noted. These gaps suggest that the reader should use some caution in interpreting these estimates. They also provide opportunities for future research - both in the area of victim impact assessments as well as further studies of jury awards.

First, the estimate of the cost of "fear" for crime victims who are not physically injured is subject to a good deal of uncertainty. The estimate used in this paper is based on only a handful of cases - some of which do not closely resemble crime situations. This is less of a problem for pain and suffering, since we have been able to estimate the cost for specific types of physical injury. Related to this problem is the fact that for some crimes (e.g. bank robbery, arson, bombings), more than one victim may suffer from fear. For these crimes, the estimates in the paper are probably too low.

Second, the cost of pain and suffering from the fears and anxieties endured by family members of crime victims has been ignored. Unfortunately, there is a lack of data on both the incidence of family suffering and the costs associated with cases involving the fears and anxieties suffered by family members who have witnessed either criminal acts and/or their effects. It is possible that a more thorough study of personal injury cases could uncover useful information in this area.

Finally, it has been assumed that society values all identical injuries the same. For example, if the victim of an assault provoked his attacker, that victim's personal valuation of "life" may be well below "average." In addition, that victim's tolerance for pain and aversion to risk is likely to be less than the average individual. Thus, to the extent victims of crime provoke the incident, these estimates may be considered somewhat high. However, it should be noted that the estimates already underestimate the cost of crime by using injury rates that are based on the risk of injury caused by strangers (instead of using the higher injury rates that would result if crimes committed by nonstrangers were included).

References

Becker, Gary, "Crime and Punishment: An Economic Approach," Journal of Political Economy, vol. 78, 1968, pp. 169-217.

Berglas, Steven, "Why did this Happen to Me?" Psychology Today, February 1985, pp. 44-48.

Bureau of Justice Statistics, U.S. Department of Justice, "Criminal Victimizations in the U.S., 1984," 1986.

_____, "The Economic Cost of Crime to Victims," by J. Frederick Shenk and Patsy A. Klaus, 1984a.

_____, Sourcebook of Criminal Justice Statistics - 1984, 1984b.

_____, "Violent Crime by Strangers," April 1982.

Cook, Philip J., "The Case of the Missing Victims: Gunshot Woundings in the National Crime Survey," Journal of Quantitative Criminology, vol. 1, no. 1, 1985, pp. 91-102.

_____ and Daniel A. Graham, "The Demand for Insurance and Protection: The Case of Irreplaceable Commodities," Quarterly Journal of Economics, 1977, pp.143-156.

Cullen, Francis T., et. al., "The Seriousness of Crime Revisited," Criminology, vol. 20, May 1982, p. 83-102.

Danzon, Patricia Munch and Lee A. Lillard, "Settlement Out of Court: The Disposition of Medical Malpractice Claims," Journal of Legal Studies, vol. 12, June 1983.

Ellis, Elizabeth M., Beverly M. Atkeson, and Karen S. Calhoun, "An Assessment of Long-Term Reaction to Rape," Journal of Abnormal Psychology, vol. 90, 1981, p. 263-66.

Franklin, Marc A., Robert H. Chanin, and Irving Mark, "Accidents, Money, and the Law: A Study of the Economics of Personal Injury Litigation," Columbia Law Review, vol. 61, January 1961.

Gould, John P., "The Economics of Legal Conflicts," Journal of Legal Studies, vol. 2, 1973, p. 279.

Hellman, Daryl A. and Joel L. Naroff, "The Impact of Crime on Urban Residential Property Values," Urban Studies, vol. 16, 1979, p. 105-112.

Howell, Ann Chandler, "Kidnapping in the United States: Characteristics and Offenders," PhD. dissertation, Temple University, May 1975.

McCahill, Thomas W., Linda C. Meyer and Arthur M. Fischman, The Aftermath of Rape, Lexington Books, 1979.

Miller, Ted, Glenn Blomquist, Charles Calhoun, Alan Dillingham and William Gellert, "Detailed Study and Data Analysis Plan: Task B Interim Report; Development of Alternative Accident Costs," prepared under contract for the Federal Highway Administration, May 1986.

Munson and Ohls, "Indirect Costs of Residential Fires," Fire Journal, Jan. 1979,

Phillips, Llad and Harold L. Votey, Jr., The Economics of Crime Control, Sage Publications, 1981 (Chapter 4).

Posner, Richard, "An Economic Theory of the Criminal Law," Columbia Law Journal, 1985, pp. 1193-1231.

_____, Economic Analysis of Law, Little, Brown, 1977.

Resick, Patricia A., "The Trauma of Rape and the Criminal Justice System," The Justice System Journal, Vol. 9, 1984, p. 52-61.

Rizzo, Mario J., "The Cost of Crime to Victims: An Empirical Analysis," Journal of Legal Studies, vol. 8, 1979, p. 177-205.

Rossi, Peter H., et. al., "The Seriousness of Crimes: Normative Structure and Individual Differences," American Sociological Review, vol. 39, 1974, p. 224-37.

Shavell, Steven, "Suit Settlement, and Trial: A Theoretical Analysis Under Alternative Methods for the Allocation of Legal Costs," Journal of Legal Studies, 1982, pp. 55-81.

Smith, V. Kerry, and William H. Desvousges, "An Empirical Analysis of the Economic Value of Risk Changes," (Vanderbilt University Working Paper), 1985.

Thaler, Richard, "A Note on the Value of Crime Control: Evidence from the Property Market," Journal of Urban Economics, vol. 5, 1978, p. 137-45.

Trubek, David M., et. al., "The Costs of Ordinary Litigation," UCLA Law Review, vol. 31, October 1983, p. 112.

Viscusi, W. Kip, Risk by Choice, (Cambridge, Harvard University Press), 1983.

Williams, Joyce E. and Karen A. Holmes, The Second Assault: Rape and Public Attitudes, Greenwood Press, 1981.

Wolfgang, Marvin E., et. al., "The National Survey of Crime Severity," Bureau of Justice Statistics, Department of Justice, 1985.

Zedlewski, Edwin W., "When Have We Punished Enough?" Public Administration Review, November 1985, pp. 771-9.

"A Quantum Study of Pain and Suffering Awards for Personal Injury in the Louisiana Appellate Courts (1983-1985)," Loyola Law Review, vol. 31, 1986, p. 855. (This is the most recent title in a series of identical studies for earlier time periods, published by Loyola Law Review since 1975.).