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RESEARCH AND
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METHODOLOGICAL SERIES

The Cost of Pain and Suffering
from Crime in Canada





**THE COST OF PAIN AND
SUFFERING FROM CRIME
IN CANADA**

Ambrose Leung



Research and
Statistics Division

May 5, 2004

The views expressed in this report are those of the author and do not necessarily represent the views of the Department of Justice Canada.

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Foreword

I am pleased to introduce *The Cost of Pain and Suffering from Crime in Canada*. In this report, Dr. Ambrose Leung presents the findings of his research to assess the extent of crime induced pain and suffering in monetary terms. While it is impossible to put an accurate price on the emotional and psychological sufferings caused by crimes, it is essential that the effort is made to estimate its cost. Not only will such attempts further the understanding of the impact of crime on society, it will also support evidence-based criminal justice policy developments by making effective cost-benefit analysis possible.

Despite the fact that it is extremely difficult and problematic to quantify the intangibles, the research adopts an innovative approach to estimate the cost of pain and suffering from crime in Canada, both overall and for specific categories of crime, namely violent crimes, property crimes and other crimes such as drug offences and *Criminal Code* traffic offences. The estimation is based on three components: the number of incidents for each type of crime, the proportion of victims feeling worried about safety, and the value of perceived and actual mental distress as a result of the crime experience.

Using both the Uniform Crime Report (UCR) and the General Social Survey (GSS) on victimization as data sources, it is established that the cost of pain and suffering from all crimes was \$35.83 billion using the GSS data, compared to \$9.83 billion using police-reported statistics.

I would like to acknowledge the contribution made by Dr. Kuan Li, Research Analyst, in carrying out this project from conception to final product. We would welcome any feedback on the Research and Statistics Division Methodological Series.

Stan Lipinski
Director, Research and Statistics Division
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Executive Summary

One of the major goals in formulating crime control policies and programs is to enhance the well-being of society. Economic analysis can be a valuable tool in working towards achieving this goal.

Comparing the monetary costs of a program to its monetary benefits can help determine whether a particular crime control program is economically efficient. When its benefits outweigh its costs, then a program is considered efficient and beneficial to society.

There are, however, few studies that systematically evaluate the costs and benefits of crime prevention programs. Part of the difficulty with this kind of study is that information on certain costs and benefits, for example, intangible costs of crime such as pain, suffering, and reduced quality of life experienced by crime victims, are not easy to obtain and evaluate. Early studies involving the estimation of the cost of crime always omitted the cost of the pain and suffering of crime victims because of a lack of available information.

Two data sources are typically used to estimate victim costs: (1) the willingness of the public to pay for additional safety and (2) the amounts awarded by juries to crime victims for the suffering and loss of productivity resulting from crime. The objective of this study is to estimate the cost of pain and suffering from crime in Canada, both overall and for specific categories of crime, namely violent crimes, property crimes, and other crimes such as drug offences and *Criminal Code* traffic offences.

The methodology developed in this study proposes that an estimation of the cost of pain and suffering requires information on the number of incidents for each type of crime, the proportion of victims feeling worried about safety, and the value of the perceived and actual mental distress resulting from the crime experience. For the purpose of the present study, information on the number of crime incidents was obtained from official police statistics recorded in the Uniform Crime Report (UCR) and from the 1999 General Social Survey (GSS) on victimization. There were, however, limitations with each of these two data sources. Police-reported statistics tend to underestimate the actual number of crime incidents due to underreporting and police resource constraints, and the information obtained from victimization surveys such as the GSS may present sample selection problems which can bias the estimation. For the proportion

of victims feeling worried about safety, information from the GSS about victims' perceptions regarding personal safety was used. With regard to the average cost of pain and suffering, estimates from previous literature were used as a guideline. The implicit average value of human life was estimated to be \$72,000¹ for non-fatal injuries. For fatal injuries, it was estimated to be between \$4.1 million to \$9.6 million dollars.

The estimated cost of the pain and suffering of crime victims was shown to be much higher when the calculation was based on information from the GSS on victimization than the calculation based on police-reported statistics. The more conservative estimates were obtained based on the assumption that the fear experienced by crime victims did not entail life-threatening injuries. The estimated cost of pain and suffering from all crimes, based on non-fatal injuries, was \$35.83 billion using the GSS data, compared to \$9.83 billion using police-reported statistics. The estimated cost of pain and suffering from violent crimes, based on non-fatal injuries, was \$20.43 billion using the GSS data and \$5.84 billion using police-reported statistics. For property crimes, based on non-fatal injuries, it was \$15.04 billion using the GSS data and \$3.63 billion using police-reported statistics.

These figures represent preliminary estimates of the cost of pain and suffering from different types of crime. Limitations of the GSS in estimating costs more precisely are being identified. Victimization surveys with more carefully designed survey questions would help in estimating more precisely the cost of pain and suffering experienced by crime victims using the methodology introduced in this paper. Further research effort might also be directed towards more sensitivity analysis to better examine how the cost estimates can change in response to different assumptions and scenarios.

¹ Unless otherwise indicated, dollar amounts are in 1999 Canadian dollars.



1.0 Introduction

One of the major goals in formulating crime control policies and programs is to enhance the well-being of society. Economic analysis can be a valuable tool in working towards achieving this goal. Comparing the monetary costs of a program to its monetary benefits can help determine whether a particular crime control program is economically efficient. When its benefits outweigh its costs, then a program is considered efficient and beneficial to society.

There are, however, few studies that systematically evaluate the costs and benefits of crime prevention programs. Part of the difficulty with this kind of study is that information on certain intangible costs of crime such as the fear, pain, suffering, and reduced quality of life experienced by crime victims is not easy to obtain and evaluate. While tangible out-of-pocket expenses, such as property loss and medical expenses, are relatively easy to evaluate, intangible costs, such as fear, pain, suffering, and reduced quality of life, though too important to ignore, can be extremely difficult to assess. Norris et al. (1997) reported that about half of violent crime victims expressed moderate to extreme distress after the crimes they experienced. Although these outcomes of victimization are not readily seen in monetary terms, individuals are willing to pay real dollars in exchange for not having to endure the emotional and psychological pain that is associated with victimization. Early studies on the estimation of the cost of crime always omitted the cost of the pain and suffering of crime victims because of a lack of available information.

Since the cost of pain and suffering is a subjective concept that varies according to individual perception and attitude, it is difficult to quantify these values. From an economic perspective, an individual's well-being is affected by things, both tangible and intangible, that can contribute to human satisfaction or dissatisfaction. For instance, to enhance the welfare of an economy as a whole, individual members of society seek to decrease the things that contribute to human unhappiness, such as the pain and suffering experienced by crime victims. To account for the social cost of crime, therefore, it is important to include estimates for the cost of pain and suffering from crime.

As pointed out by Viscusi (1993), health and safety risks contribute to human unhappiness. One possible source of health risk is the distress that results from the pain and suffering caused by crime. In the economic literature, victim costs are typically estimated based on two data sources: (1) contingent valuation² placed on safety by the public and (2) the amounts awarded by juries to crime victims for the suffering and loss of productivity resulting from crime.

To minimize health risks, individuals generally aim to avoid activities that present such risks. Most individuals are willing to accept a higher level of health risk when higher premiums are offered as compensation. In the broadest sense, such compensation is considered a measure of an individual's contingent valuation on pain and suffering. In the economic literature, the dominant approach to estimating the risk-dollar tradeoff between health risks and the corresponding compensation required is to use labour market data on worker wages for risky jobs (Viscusi, 1993). When workers accept jobs with potential exposure to work injuries which might cause pain and suffering, it is an indication of their contingent valuation on the pain and suffering which might result from exposure to health risks in exchange for monetary compensation.

To estimate the cost of pain and suffering from crime, Anderson (1999) followed the suggestion of Viscusi and used labour market estimates as a proxy for the value of life and injury based on individual willingness to accept work that might affect health. Studies that have used labour market estimates as a proxy for the value of life and injury may represent conservative estimates of the risks to life and health that crime presents since there is likely a higher level of stress in the case of crime. Other studies used jury awards in personal injury accident cases to obtain monetary values for pain, suffering, and fear. However, Canadian data on jury awards can be difficult to obtain as they are not publicly available. Given these limitations, this study attempts to devise a more viable method to provide some preliminary estimates of the cost of pain and suffering from crime in Canada.

The objective of this study is to estimate the cost of pain and suffering from crime in Canada, both overall and for specific categories of crime, namely violent crimes, including homicide, assault, sexual offences, and robbery;

² *Contingent valuation* refers to the value people place on something that may or may not happen, that is, how much they are willing to pay to feel safe or to avoid risks or losses.



property crimes, including breaking and entering, motor vehicle theft, non-vehicle theft, and vandalism; and other crimes, namely drug offences and *Criminal Code* traffic offences. This paper begins with a brief review of the recent literature on victimization costs, followed by an analysis and estimation of the cost of pain and suffering from crime in Canada.



2.0 Literature Review

In the current literature, victim costs are typically estimated from two data sources: (1) contingent valuation placed on safety by the public and (2) the amount of jury awards to crime victims for the suffering and loss of productivity resulting from crime.

In his comprehensive study, Anderson (1999) estimated the value of risks to life and health in the case of violent crime in the United States. Anderson used labour market estimates as a proxy for the value of life and injury based on individuals' contingent valuation on work that might affect their health and cause pain and suffering. He estimated that the total cost of the risk to life and health violent crime presents amounted to US\$574,395 million. Although such a proxy of values does capture the perceived risks of pain, suffering, and mental distress, the level of distress may be considerably higher in the case of violent crime than the level of distress expected from a risky work environment. Furthermore, the individuals who choose to do risky jobs may place a lower value on their health. Therefore, Anderson concluded that the calculation of the value of risks to life and health based on labour market estimates possibly represents the lower bound of estimates for the risks to life and health that violent crime presents.

An example of using jury awards to evaluate the cost of the pain and suffering of crime victims was provided by Cohen (1988). Cohen's most significant contribution to the literature is his methodology for estimating the pain, suffering, and reduced quality of life endured by crime victims. Cohen and his colleagues have conducted numerous studies to estimate the cost of crime that included the cost of pain and suffering.

Cohen (1988) combined actual victim injury rates and jury awards in personal injury accident cases to obtain monetary values for pain, suffering, and fear. To obtain a measure of pain and suffering, Cohen used information from compensation awarded by courts to victims, also known as "jury awards." Jury awards are divided into two categories: "special" damages intended to compensate for medical expenses and lost wages and "general" damages intended to compensate for the pain and suffering of the victims. Cohen

obtained data on the two estimates for different kinds of crimes and provided estimates for pain and suffering using the following regression:

$$gd = c + a * sd$$

In this regression, gd = general damages, sd = special damages, c is a constant and a is the estimated coefficient of sd . For example, Cohen estimated the following regression equation for gunshot victims:

$$gd = US\$17,957 + US\$5.20 * sd$$

This means that for every US\$1,000 of special damages (medical costs + lost wages) awarded by the court, the estimated award for general damages that covers pain and suffering is $US\$17,957 + US\$5.20 * 1,000 = US\$23,157$.

Cohen also combined estimates of the value of life with crime-related death rates to obtain the risk of death from crime. The probability of death is calculated by dividing the number of murders associated with each type of crime by the number of those crimes committed. The probability of death is then multiplied by the estimated value of a statistical life, that is, US\$2,000,000 (this value is based on estimates from previous studies [see Viscusi, 1993]), to obtain the risk of death for different types of crime.

Cohen then combined the values for risk of death, pain, and suffering with direct losses to obtain a total cost to victims for ten different types of crime. The average cost of crime to victims was found to be the highest in the case of kidnapping (US\$110,469), followed by bombing (US\$77,123). For each of the cost categories, bombing was found to contribute the largest loss of value in terms of direct loss (US\$24,737); the highest cost for pain and suffering was found in rape (US\$43,561); and kidnapping was most costly in terms of risk of death. Bank robbery, for example, was found to have a total cost of US\$18,810 (US\$4,422 for direct losses, US\$10,688 for pain and suffering, and US\$3,700 for risk of death).

Cohen (1990) estimated the costs to victims of rape, robbery, assault, car theft, burglary, and larceny. His estimates included the cost of pain, suffering, and risk of death, and he reported that the total cost per year in the United States was US\$113 billion. In another study, Miller, Cohen, and Wiersema (1995) estimated that the cost of violent crimes and property crimes to victims was



US\$472 billion per year, including the cost of pain, suffering, and reduced quality of life.

In 1994, Cohen, Miller and Rossman estimated the total cost of violent crimes, including rape, robbery, assault, and murder, in the United States to be \$183 billion per year. For each type of violent crime identified in the study, three types of cost are measured to contribute to the total cost: (1) direct costs such as medical and insurance costs; (2) lost productivity measured by forgone market wages and fringe benefits and housework; and (3) the cost of pain and suffering. The costs of non-fatal injuries were estimated by multiplying estimates of the loss in quality-adjusted life years (QALYs)³ by the value of a life lost per year. Quality of life losses were rated on a scale that included different kinds of actual and psychological pain and suffering. In short, Cohen made a significant contribution to the development of important guidelines for estimating the cost of the pain and suffering experienced by crime victims.

An alternative method for estimating the value of reduced quality of life as a result of crime is to compare the housing prices in high and low crime areas, sometimes referred to as the "revealed preference" approach. In a study using this approach, Rizzo (1979) suggested a possible relationship between the amount of crime and reduced housing prices. Rizzo began his analysis by stating that the social cost of crime should include the "estimated market value of goods and property stolen or destroyed, loss of earnings due to personal injury or death, a rough estimate of expenditures to avoid crime by individuals and public agencies, and so forth [such as reduced value of housing]." Rizzo proposed a theoretical framework by assuming a closed system comprised of *n* communities or blocks that is characterized by a competitive housing market. Housing services produced in a community are affected by the level of crime in the community, the amount of land, and the amount of capital. Furthermore, the level of crime is affected by the amount of self-protection taken by the community. A representative consumer weighs the cost of self-protection against the benefit of crime reduction.

Based on this theoretical framework, Rizzo first examined the cost of crime in terms of reduced housing prices. He used data from Chicago to examine the relationship between crime rate and rental price per unit, holding constant the

³ *Quality-adjusted life years* refers to the number of years of life weighted by a utility value of the relative quality of life experienced. QALYs are estimated by multiplying each life year by a quality-weighting factor that reflects the individual's quality of life.

size and other characteristics of apartments. Variables used to explain rent differences included the average number of rental rooms on a block, the proportion of relatively new housing built after 1960, the family income average, the distance from the University of Chicago campus, the proportion of white population on the block, and various regional dummy variables.⁴ Variables used in the empirical analysis were mostly entered in logarithmic form to give percentages instead of absolute differences. Hence, according to Rizzo, "the sum of the coefficients should be interpreted as the effect of a one per cent increase in crime as we move from one sub-area to another in this community."

From the regression estimates, Rizzo attempted to derive the cost of crime for victims and potential victims. The author concluded that, on average, the cost of crime was found to be higher in the Hyde Park-Kenwood area than the entire city of Chicago. Rizzo's study has provided the methodology to estimate partial crime costs based on the estimated value of housing.

These different methods for calculating victimization costs are being criticized, however. Jury awards are being criticized for inflating the value of pain and suffering (Zimring and Hawkins, 1995) and, therefore, overestimating victimization costs. The willingness-to-pay approach requires information from the public that has to be obtained through either labour market estimates or victimization surveys. Critics pointed out that the study of victimization has received limited attention until recently (Winterdyk, 2000) and that information from victimization surveys is limited. Furthermore, the results and recommendations provided by various studies depend heavily on the sample used in a particular survey and can, therefore, be biased. There are currently no agreed upon methods among researchers for estimating the intangible costs of victimization, such as the cost of pain and suffering or the value of a shattered life. This is perhaps one of the main reasons why cost-benefit analyses have not been widely applied to evaluate different kinds of crime prevention programs and policies. The present study attempts to provide some preliminary estimates for the cost of the pain and suffering endured by crime victims in Canada by using information from a victimization survey.

⁴ A *dummy variable* is a variable that appears in a calculation only as a placeholder. It disappears completely in the final result.



3.0 Data Sources

To estimate the cost of pain and suffering from crime in Canada, three kinds of information are deemed necessary: the number of incidents of crime, the proportion of crime victims expressing fear about safety, and the willingness of crime victims to pay for safety.

3.1 Number of Crimes

An important component of the present study was obtaining an estimation of the number of incidents of different types of crime that occurred in Canada in a given period of time. In Canada, crimes known to the police are recorded in the Uniform Crime Report (UCR) which has been compiled by the Canadian Centre for Justice Statistics (CCJS) since 1962. The UCR is an aggregate census based on almost 100 percent compliance by about 1,800 different police services across Canada who report the number of crimes known to them to CCJS each month. A count of crimes known to police includes records of all complaints of crime made to police agencies by victims, infractions discovered by police officers, and other possible sources (Siegel and McCormick, 1999). Despite the importance and common use of such police statistics by researchers, crimes that occurred but were not reported to police by victims remain an important omission in the UCR. One way to estimate the extent of unreported crime is through victimization surveys. For example, by comparing victimization data from the General Social Survey (GSS) conducted in 1999 to police statistics, Mihorean (2001) noted that almost 60% of victimization incidents were not reported to police; only about 1/3 of household thefts and less than 1/4 of sexual assaults were reported to the police. Using the GSS data from 1993, Gartner and Doob (1994) reported that only 2/3 of the breaking and entering offences, half of the vehicle thefts, 1/3 of the assaults, and 1/10 of the sexual assaults discovered in the GSS were reported to the police. Not surprisingly, victimization surveys consistently report higher rates of victimization than statistics reported by the police. Similar observations can also be found in international evidence. For example, Brand and Price (2000) used the British Crime Survey to estimate the cost of crime in England and Wales and found that the number of crimes reported by the survey was about as much as four times higher than that recorded by the police. It is apparent that in calculating the cost of pain and suffering from

crime, information from victimization surveys can help to provide more realistic estimates on the number of incidents that occurred. The present study attempts to provide estimates of this cost in Canada by using victimization data from the GSS whenever possible. For crimes that are not contained in the 1999 GSS on victimization, police statistics from *Canadian Crime Statistics*, a publication based on the UCR, is used as the basis for projecting estimates.

The analysis in this study uses, wherever appropriate, data from the 1999 GSS on victimization. Estimates based on police statistics are provided for comparison purposes. According to the information collected, the risk of violent victimization in Canada remains low—only 5% of the population reported being victims of violent crime in 1999—and the type of violent crime with the highest rating was assault. The risk of being a victim of property crime, on the other hand, is much higher, at almost 20% (Mihorean et al., 2001).

For the 1999 GSS, interviews were conducted by telephone with 25,876 Canadians aged 15 and above. One of the main objectives of the survey was to measure, as in previous years, the occurrence of violent crimes, including assault, sexual offences, and robbery, and property crimes, including breaking and entering, motor vehicle theft, theft of household property, and vandalism. Victims were asked when and where the crimes occurred and how they were affected by the experience. For incidents that involved more than one type of offence, the most serious offence was used for classification purposes. Offences were ranked from most to least serious as follows: sexual assault, robbery, assault, breaking and entering, motor vehicle theft, theft of personal and household property, and vandalism (Mihorean, 2001).

In addition, the survey asked victims whether the incidents were reported to the police. This piece of information can be useful in comparing victimization survey results with police statistics. For the remaining three types of crimes, namely homicide, drug offences, and *Criminal Code* traffic offences, for which the GSS provides no information, the analysis was based on police records from *Canadian Crime Statistics* extracted from the UCR. This analysis compares, wherever possible, police data and information from the GSS on victimization and provides an estimation of the cost of the pain and suffering experienced by crime victims. Table 1 provides a summary of the statistics on the number of incidents for different categories of crime reported by the GSS on victimization and the *Canadian Crime Statistics*.



Table 1: Total Number of Incidents of Crime in 1999

	GSS on Victimization (sample population = 25,876)		Canadian Crime Statistics (population = 30,491,294)	
	Total Number of Incidents	Rate of Victimization (per 1,000 in population)	Total Number of Incidents	Rate of Victimization (per 1,000 in population)
Violent Crimes	N/A	N/A	291,330	10
Homicide	N/A	N/A	536	0.02
Assault	549	21	233,465	8
Sexual Assault	300	12	23,872	0.8
Robbery	245	10	28,745	1
Property Crimes	N/A	N/A	1,300,650	43
Breaking and Entering	906	35	318,448	10
Motor Vehicle Theft	1,252	48	161,405	5
Theft (Not Vehicle)	2,194	85	701,573	23
Mischief/Vandalism	947	37	312,563	10
Drug Offences	N/A	N/A	79,871	3
<i>Criminal Code</i> Traffic Offences	N/A	N/A	137,138	5
All Crimes	N/A	N/A	2,613,348	86

3.2 Pain and Suffering of Crime Victims

Research shows that victimization can affect a victim's perceptual world and cause pain and suffering as a result. Furthermore, the psychological effects of trauma caused by crimes can be long-lasting (Hill, 2003). Greenberg and Ruback (1992) found that anger and fear were among the most common emotional responses to victimization. Moreover, while anger was more likely to be evident with victims of property crime, fear was found to be more prominent with victims of sexual assault and other types of violent crime.

The 1999 GSS on victimization asked all respondents about their fear of crime. The survey results showed that Canadians generally feel safe. It indicated that 91% of Canadians reported being very or somewhat satisfied with their personal safety. The survey also contains detailed information on how crimes affected the feelings and emotions of victims, which were expressed in terms of anger, depression, disappointment, and anxiety. For instance, the survey found that more than 50% of property crime victims felt angry after the crime and about 25% of crime victims had their main activity disrupted for at least one day as a result of their experience. Overall, victims of sexual assault were the most likely to experience fear, followed by victims of robbery. In general, the victims of violent crime experienced higher levels of fear and distress than the victims of property crime. Information from the GSS, therefore, provides estimates for the proportion of the population expressing emotional pain and suffering caused by different types of crime.

3.3 Estimation of the Cost of Pain and Suffering from Crime

Once the number of each type of crime for a given period of time is estimated, data on the cost of the pain and suffering experienced by crime victims is required to estimate the total cost of pain and suffering for different categories of crime. As previously mentioned, the analysis in this study estimates such costs by evaluating, wherever possible, the level of distress, anger, fear, and anxiety experienced by crime victims. Estimates from previous studies on the cost of pain and suffering from crime (Anderson, 1999; Brantingham and Easton, 1998; Cohen, 1988 and 1990; Miller, Cohen, and Wiersema, 1996) are also used as references for the estimation.

One way to estimate the burden of pain and suffering on crime victims is to obtain information from the amount of jury awards given to victims for the suffering and loss of productivity resulting from crime. Waller and Welsh (1995), for example, used information from jury awards in the United States as a proxy in their estimation of the cost of the pain and suffering of crime victims in Canada; the available information on jury awards in Canada was insufficient.

Another approach for estimating the cost of pain and suffering is to measure the contingent valuation people place on the avoidance of pain and suffering associated with being a victim of crime. Anderson (1999), for instance, used labour market estimates as a proxy for the value of life and injury based on the contingent valuation people place on work that might affect their health and



cause pain and suffering. Although the level of distress may be considerably higher in the case of violent crime compared to the distress expected from a risky work environment, such a calculation is still useful in that it can represent the lower bound of estimates for the risks to life and health that violent crime presents. The contingent valuation approach is particularly appropriate when information on the existence of traumatic feelings among victims of different crimes is made available from the GSS on victimization.



4.0 Methodology

To derive the total cost of pain and suffering from crime in Canada (C_j), estimates for three components are required: the number of incidents for a certain type of crime (N_j), the proportion of the population feeling worried about safety (P_{wj}), and the value of perceived and actual mental distress as a result of the crime experience (V_j). Given information on these three components, the total cost of pain and suffering from crime can be calculated using the following formula:

$$C_j = N_j * P_{wj} * V_j \quad (1)$$

In this formula, j = any number from 1 to n and indicates each type of crime assessed.

The purpose of this section on methodology is to explain the derivation of the three components N_j , P_{wj} , and V_j and to discuss the limitations and boundaries related to the gathering and processing of the required information.

4.1 Number of Crime Incidents

The total number of incidents for each type of crime assessed in this study can be obtained from two sources: (1) police statistics from the UCR and (2) the 1999 GSS on victimization. As discussed in the previous section, police statistics consistently report lower rates of victimization than victimization surveys. Hence, the total cost of pain and suffering from crime will be underestimated if only police statistics are used to perform the analysis.

In the GSS on victimization conducted in 1999, survey participants were asked to indicate whether they were victims of certain crimes, including assault, sexual offences, robbery, breaking and entering, motor vehicle theft, theft of household property, and vandalism, in the 12 months prior to the survey. The present analysis uses this information to estimate the total number of incidents for each type of crime (N_j) based on the total number of survey participants

(25,876) and the total population of Canada in 1999 (30,491,294). N_j can then be derived as follows:

$$N_j = \frac{\text{Number of victims as reported in GSS}}{\text{Number of survey participants in GSS}} * \text{Total population} \quad (2)$$

For other crimes, such as homicides, drug offences, and *Criminal Code* traffic offences, where the GSS provides no information, the number of incidents reported by police statistics are used. For homicides, police records are considered to provide accurate information since evidence from homicides, such as corpses, is likely to be discovered at some point after the crime has been committed. For drug offences and *Criminal Code* traffic offences, police statistics are likely to underestimate the actual number of offences due to underreporting and limitations imposed on policing efforts, such as budgetary constraints.

4.2 Proportion of Population Feeling Worried about Safety

The GSS on victimization contains different measures of individuals' feelings about safety. For the purpose of the present analysis, the following four questions relating to safety issues are used to construct a measure of safety perception by the public and by crime victims⁵ :

- (i) "safety when walking alone after dark";
- (ii) "safety when using public transportation after dark";
- (iii) "safety when alone at home in the evening/at night"; and
- (iv) "degree of satisfaction with safety in general."

Survey responses are summarized in Table 2. From the answers given to any or all of these four questions, the proportion of survey participants feeling very worried about safety can be derived. For example, if an individual is considered to express distress about safety when "very unsafe" or "very worried" is chosen as a response to any of the four questions, then 2,349 of the 25,876 survey participants expressed worries about their safety. If the sample of survey participants is representative of the Canadian population, then 9.1%

⁵ The safety perception from the four questions is considered to be a direct result of the crime experience in the case of crime victims. Realistically, however, it is impossible to determine the exact portion of worries that result directly from crime experience until more specific questions are included in the survey.



of Canadians express general concerns about safety, whether they were crime victims in the previous 12 months or not.

The GSS on victimization further implies that victims of various crimes are more likely to express worries about safety. The proportion of crime victims expressing worries for each type of crime (P_{wj}) can be calculated as follows:

$$P_{wj} = \frac{\text{number of victims expressing worries about safety}}{\text{total number of victims for the crime}} \quad (3)$$

Table 2: Survey Responses to "Safety" Questions in the 1999 GSS

Question	Response	Number of Individuals (total = 25,876)
Safety when walking alone in own area after dark	Very safe	8919
	Reasonably safe	9728
	Somewhat unsafe	2737
	Very unsafe	1215
	Doesn't walk alone	3208
	Don't know	63
When using public transportation after dark, you feel...	Very worried	807
	Somewhat worried	3123
	Not at all worried	4196
	Do not use transit at night	11093
	No public transit available	6610
	Don't know	42
	Not stated	5
Feelings when alone at home in the evening/at night	Very worried	536
	Somewhat worried	4698
	Not at all worried	20390
	Never alone	197
	Don't know	48
	Not stated	7
Degree of satisfaction with safety	Very satisfied	11715
	Somewhat satisfied	101646
	Satisfied	195
	Somewhat dissatisfied	1116
	Very dissatisfied	513
	Dissatisfied	13
	No opinion	300
	Not stated	378

The measure P_{wj} is consistently higher for different types of crime than concerns about safety by the general public. This implies that crime victims are more likely to be concerned about their general safety than individuals who have not been crime victims. For example, 53% of individuals who were victims of assault in the 12 months prior to the survey expressed worries about safety (compared to 36% of the general population). See Table 3 for the proportion of crime victims feeling worried about safety based on information from the 1999 GSS on victimization.

Table 3: Proportion of Victims Feeling Very Worried about Safety

Type of crime	Number of Victims Feeling Very Worried about Safety	Number of Incidents	Proportion of Victims Feeling Very Worried about Safety (P_{wj})
Assault	91	549	16.6%
Sexual Assault	70	300	23.3%
Robbery	54	245	22.0%
Breaking and Entering	161	906	17.8%
Motor Vehicle Theft	165	1,252	13.2%
Theft (Not Vehicle)	249	2,194	11.4%
Mischief/Vandalism	132	947	14.0%

In estimating the total cost of pain and suffering from crime, two different measures for the proportion of the population feeling worried about safety are to be considered. For every crime that occurs, there exists the (direct) cost of pain and suffering on crime victims. The existence of crime, however, can further impose stress and (indirect) cost on the general population, including on individuals who are not crime victims. For the purpose of the present analysis, the focus is on the cost of pain and suffering experienced by crime victims.

Consider the case of homicide. Although the deceased victims do not experience any pain and suffering after the crime, the expected cost of each homicide is rather high. Part of the cost consists of the cost of each human life lost. Another important component is the cost of distress and fear instilled in the general population. For drug and *Criminal Code* traffic offences, no



information is made available from the GSS unfortunately. From an economic perspective, drug and *Criminal Code* traffic offences are sometimes considered victimless crimes as the offenders of these crimes are often their own victims. The cost of pain and suffering from these crimes is therefore mostly borne by the distress and fear imposed on the general population. Hence, the proportion of the general population feeling worried about safety will apply in these cases.

Another consideration that can affect the cost of pain and suffering is the proportion of worries that are attributed directly to the crime experience of victims. For example, an experience with violent crime (which by definition targets the person) is much more likely to have a deeper impact on the victims feeling worried than an experience with property crime (which by definition targets non-humans). Hence, it is reasonable to assume that the worries of victims of violent crime are more likely to be caused by their crime experiences than would be the case with victims of property crime. To accommodate for such differences, the estimates provided here assume that most of the worries victims of violent crime have about safety are a direct result of their violent crime experiences, while not all the worries victims of property crime have about safety stem directly from their property crime experiences. The worries about safety of property crime victims will, therefore, be discounted using a discount factor.

4.3 Expected Value of Distress and Worry

Information on the expected value of distress and worry as a result of crimes is most difficult to assess. Ideally, victimization surveys can be designed to contain questions concerning individual willingness to pay for reduced fear and worry about safety such as the amount an individual is willing to pay for additional police services to lessen the risk of being a crime victim. In the existing literature, the estimates of victim costs, mostly for the United States, are dominated by two data sources: (1) contingent valuation placed on safety by the public and (2) the amounts awarded by juries to crime victims for the suffering and loss of productivity resulting from crime. Neither piece of information is readily available in Canada.

To minimize the health risks, individuals generally aim to avoid activities that present such risks. In the economic literature, the dominant approach to estimating the risk-dollar tradeoff is to use labour market data on worker wages for risky jobs (Viscusi, 1993). When a worker accepts a job with

potential exposure to work injuries that can cause pain and suffering and with associated health risks, it is an indication of that individual's contingent valuation on the pain and suffering which Viscusi (1993) as a proxy for the value of life and injury from crime. Anderson pointed out that such estimates reflected "the amounts individuals are willing to might result from exposure to health risks in exchange for monetary compensation.⁶ Anderson (1999) used the average value of labour market estimates provided by accept to enter a work environment in which their health state might change" and that "(such) values do capture perceived risks of pain, suffering, and mental distress associated with the health losses."

For the purpose of the present analysis, the values reported by Viscusi are used and converted to 1999 Canadian dollar values. Viscusi provided estimates for both fatal and non-fatal risks, where the risk measures are labour market estimates as described above. Death risks associated with a certain job are referred to as fatal risks. However, jobs that are risky also tend to be unpleasant in other respects which are referred to as non-fatal risks by Viscusi. In the context of the pain and suffering experienced by crime victims, risks of fatal injuries obviously relate to worries about death; risks of non-fatal injuries can be related to worries about decline in individual well-being as a result of crime, such as emotional distress from property loss. Viscusi implied that the implicit average value of human life from non-fatal injuries was US\$52,637 in December 1990. After adjusting for inflation, that amount was equivalent to approximately CAD\$72,000 in 1999. For fatal injuries, Viscusi reported that the implicit value of human life was estimated by major studies to be mostly between US\$3 million and US\$ 7 million in 1990, which, in 1999, was equivalent to CAD\$4.1 million to CAD\$9.6 million. The estimates in this report are based on non-fatal risks.

Based on the assumption that an average individual generally values life, critics pointed out that human life is therefore priceless, and it appears to be immoral to attach a monetary value to a human life. It was not the intention of Viscusi, however, to set a price on an average human life. Furthermore, there is no assumption that any worker who accepts work with certain health risks is ready to give up his or her life. What is implied with the statistical value of a human life is the loss of value to society whenever a human life is lost. From

⁶ As explained by Viscusi, while labour market estimates indicate the wage that workers require to accept risks, policy evaluations are based on willingness to pay for risk reduction. Evidence from experimental studies showed that for sufficiently small risk changes at the margin, the differences between willingness-to-pay and willingness-to-accept values were insignificant.



an economic perspective, there is no market for the trading of human lives, but a human life does have a value.

4.4 Sensitivity Analysis

The final estimation of the cost for various types of crime will depend on the assumptions on which the analysis is based. This is referred to as "sensitivity analysis" in the literature. For example, the cost is likely to vary when different data sources are used for the estimation. The purpose of a sensitivity analysis is to take into account uncertainty and different possible circumstances. A sensitivity analysis can help, in the case of project evaluation for instance, to determine whether the implications from the outcome of a program remain the same when different assumptions are made. The results are generally considered more "robust" or stronger if the outcome of a program does not alter under different scenarios. In estimating the cost of the pain and suffering of crime victims, sensitivity analysis provides a range of estimates for comparison purposes. For example, the implicit value of a human life was estimated by major studies to fall between a relatively wide range of \$4.1 million and \$9.6 in 1999. The estimated cost of pain and suffering for the different categories of crime are thus to be quite different depending on the figure used for the value of a human life.



5.0 Estimation of the Cost of Pain and Suffering from Crime in Canada

Based on the methodology described in section 4, the cost of the pain and suffering resulting from various types of crime are derived in this section. As previously mentioned, police statistics underestimate the number of crime incidents due to underreporting and various constraints faced by law enforcement officials. Victimization surveys provide better estimates of the actual number of crime incidents, but the estimates may be biased due to sample selection problems. Furthermore, victimization information from the GSS does not include all the types of crime included in the present analysis. The limitation on data, therefore, remains a serious problem in estimating the cost of the pain and suffering of crime victims in Canada. The computation of cost using both police records and information from the GSS is presented here for comparison purposes. All estimated figures hereafter are recorded in 1999 Canadian dollars since the GSS data were collected in 1999. The types of crime discussed are violent crimes, property crimes, and other types of crime, namely drug offences and *Criminal Code* traffic offences. The estimation results are contained in Table 4.

5.1 Violent Crimes⁷

The GSS contains victimization information on three types of violent crime: assault, sexual offences, and robbery. It is obvious that the GSS cannot gather information from victims of homicide. The number of incidents from police records will therefore be used for homicide. As previously mentioned, the number of homicide incidents reported in police statistics is likely to provide reliable estimates due to the nature of the crime and the evidence that can be collected after such a crime.

⁷ Readers are cautioned that the cost of violent crime in this context refers to the total cost of four major types of violent crime, namely homicide, assault, sexual assault, and robbery. The costs of other types of violent crime were not included in this particular measure of the cost of violent crime.

Table 4: Estimated Cost of the Pain and Suffering of Crime Victims Based on Non-fatal Injuries

Type of crime	Cost Based on Police-Reported Statistics* (\$ million)	Cost Based on GSS Data* (\$ million)
Homicide ^{#†}	2,200	2,200
Assault	2,790	7,730
Sexual Assault	400	5,930
Robbery	455	4,570
Violent Crimes	5,840	20,430
Breaking and Entering	1,020	3,420
Motor Vehicle Theft	383	3,510
Theft (Not Vehicle)	1,440	5,310
Mischief/Vandalism	788	2,810
Property Crimes	3,630	15,040
Drug Offences [†]	131	131
<i>Criminal Code</i> Traffic Offences [†]	225	225
Other Crimes [†]	356	356
All Crimes	9,830	35,830

* Average cost = \$72,000 per victim.

Homicide is by definition fatal to the crime victims. The figure for the lower bound of cost based on non-fatal injuries was used here for the calculation of the cost of violent crimes and the cost of all crimes.

† As the GSS does not provide data for these crimes, estimations based on police statistics were used in this case for the calculation of the cost of violent crimes and the cost of all crimes.



By definition, homicide victims experienced fatal injuries. For the cost of other types of violent crime estimated in the present analysis, two types of cost estimations can be compared based on whether the injuries suffered by a crime victim are fatal or non-fatal.⁸ For the purpose of this report, only cost estimates based on non-fatal risks are used. For non-fatal injuries, the average cost of pain and suffering is estimated as \$72,000 per victim. The estimated cost of pain and suffering for various types of crime is provided in Table 4.

Based on the estimated statistical value of a human life according to previous literature, the cost of pain and suffering from the 536 incidents of homicide reported by police statistics in 1999 is \$2.2 billion. For other types of violent crime, the cost of pain and suffering can be estimated by using the methodology described in section 4. The cost figures can vary, however, depending on the data sources used for the number of incidents. For these numbers, the figures reported by police statistics are significantly smaller than those from the GSS due to underreporting. The estimated costs for various types of crime based on police records are, therefore, much lower.

When the perceived risks are based on non-fatal injuries, the average cost of the pain and suffering of a crime victim is estimated to be \$72,000. The cost of pain and suffering for non-fatal injuries from assault, sexual offences, and robbery are then estimated to be \$2.79 billion, \$400 million, and \$455 million respectively, based on the number of incidents reported by police statistics in 1999. The total cost of these violent crimes is, therefore, estimated to be \$5.84 billion, if the perceived injuries are non-fatal.

As shown in Table 4, the estimated cost of pain and suffering for different categories of violent crime are much higher when the calculation is based on GSS data. The cost of pain and suffering for non-fatal injuries from assault, sexual offences, and robbery is estimated to be \$7.73 billion, \$5.93 billion, and \$4.57 billion respectively, based on the number of incidents reported in the GSS on victimization. The total cost of these violent crimes is, therefore, estimated to be \$20.43 billion for non-fatal injuries when it is based on GSS data.

⁸ Estimates for fatal injuries are used to indicate upper bounds on the cost of different types of violent crime.

5.2 Property Crimes

The four types of property crime included for cost estimation here are breaking and entering, motor vehicle theft, non-vehicle theft, and vandalism.⁹ Both the police statistics and the GSS data contain information on all four types of crime. For each of these different types of crime, as in the estimation for violent crime, a comparison can be drawn between figures obtained using police statistics and the GSS data. Property crimes by definition do not involve human victims and are not likely to lead to fatal injuries. Only the values for non-fatal injuries will be assessed for property crimes. Furthermore, it is assumed in this estimation that 25% of the worries experienced by property crime victims are a direct consequence of their crime experiences, meaning that a discount factor of 0.25 is chosen for the current analysis. It is therefore implied that the cost of the pain and suffering borne by property crime victims is much higher if a higher discount factor is used.

Using information from police statistics, the estimated cost of pain and suffering for non-fatal injuries from the four types of property crime are \$1.02 billion for breaking and entering, \$383 million for motor vehicle theft, \$1.44 billion for non-vehicle theft, and \$788 billion for vandalism, with a discount factor of 0.25. Based on information from police statistics, the cost of property crimes is, therefore, estimated to be \$3.63 billion for non-fatal injuries.

As shown in Table 4, the corresponding figures are much higher when the estimation is based on the GSS data. The costs of pain and suffering from breaking and entering, motor vehicle theft, non-vehicle theft, and vandalism are estimated to be \$3.42 billion, \$3.51 billion, \$5.31 billion, and \$2.81 billion respectively, based on the number of incidents reported in the GSS for perceived non-fatal injuries when a discount factor of 0.25 is used. Based on information from the GSS data, the cost of property crimes is, therefore, estimated to be \$15.04 billion for non-fatal injuries.

5.3 Other Crimes

The remaining two types of crime discussed in the current analysis are drug offences and *Criminal Code* traffic offences. By definition, drug overdoses and reckless driving can cause fatal injuries. However, for the purpose of this

⁹ The costs of other types of property crime were not included in this particular measure of the cost of property crime.



report, only cost estimates based on non-fatal injuries are given. Since the GSS does not contain any information on drug offences and *Criminal Code* traffic offences, the cost estimations for these two types of crime are based on the number of incidents reported by police statistics. Because of underreporting and constraints faced by the police, the cost of pain and suffering for these two types of crime are likely to be underestimated.

The cost of pain and suffering from drug offences and *Criminal Code* traffic offences is estimated to be \$131 million and \$225 million respectively, based on non-fatal injuries and a discount factor of 0.25. The cost is much higher if the estimates are based on fatal injuries.¹⁰

5.4 Total Cost for All Crimes

The total cost of pain and suffering for all crimes is estimated in the present analysis based on four types of violent crime-homicide, assault, sexual assault, and robbery; four types of property crime-breaking and entering, motor vehicle theft, non-vehicle theft and vandalism; and two other types of crime-drug offences and *Criminal Code* traffic offences.¹¹ The most conservative estimate is based on the assumption that all crime victims perceive their risk of injuries as non-fatal and only 25% of the worries expressed by property crime victims are caused directly by their crime experiences. The total crime bill for all crimes in this case adds up to \$9.83 billion based on the number of incidents reported by police statistics and \$35.83 billion based on data from the GSS. In the case of violent crime, if the risk to safety is perceived as fatal by victims, then the estimated cost is based on the implicit value of human life, and the corresponding cost estimates are much higher.

5.5 Sensitivity Analysis

The final estimation of the cost for various types of crime will change, rather drastically in some cases, when the analysis is based on different assumptions. For example, if it is assumed that all the worries of property crime victims can be attributed to their crime experiences, then the cost of pain and suffering from property crimes will be four times higher than the earlier estimates using a 0.25 discount factor. Based on GSS data, this implies that the costs for breaking and entering, motor vehicle theft, non-vehicle theft, and vandalism

¹⁰ For the corresponding figures based on fatal injuries, the costs are estimated to be \$29.80 billion to \$69.78 billion for drug offences and \$51.17 billion to \$119.80 billion for *Criminal Code* traffic offences, depending on the figure used for the average value of a human life.

¹¹ The costs of other types of crimes were not included in this particular measure of the cost of all crimes.

will be \$13.68 billion, \$14.02 billion, \$21.22 billion, and \$11.25 billion respectively, for a total cost of \$60.17 billion for property crime. Based on police statistics, the total cost for property crime will be \$14.52 billion when no discounting on worries is used.

Another example of differences in assumptions leading to much higher estimates is a calculation of costs based on fatal injuries. According to Viscusi (1993), the average cost of fatal injuries can be as high as \$9.6 million per victim (compared to only \$72,000 per victim for non-fatal injuries). If the cost of violent crimes is calculated based on the upper bound of fatal injuries, then the cost of pain and suffering from violent crimes will be a phenomenal \$7.47 trillion based on GSS data and \$1.53 trillion based on police statistics.

From these two examples, it can be concluded that it is important to perform at least some sensitivity analysis for comparison purposes. The estimates change significantly when different assumptions are applied.



6.0 Concluding Remarks

The major goal of this study is to estimate the cost of the pain and suffering borne by crime victims for different types of crime, including homicide, assault, sexual offences, robbery, breaking and entering, motor vehicle theft, non-vehicle theft, vandalism, drug offences, and *Criminal Code* traffic offences. The methodology developed in this study proposed that an estimation of the cost of pain and suffering requires information on the number of incidents for each type of crime, the proportion of victims feeling worried about safety, and the value of perceived and actual mental distress as a result of the crime experience.

For the purpose of the present study, information on the number of crime incidents was obtained from police statistics recorded in the UCR and from the GSS on victimization. There were limitations with both of these data sources. While police statistics tend to underestimate the actual number of crime incidents due to underreporting and police resource constraints, information obtained from victimization surveys such as the GSS may present sample selection problems which can bias the estimation. For the proportion of victims feeling worried about safety, information from the GSS about victims' perceptions regarding personal safety was used. With regard to the average cost of pain and suffering, estimates from previous literature were used as the guideline. The implicit average value of human life based on non-fatal injuries was estimated to be \$72,000. For fatal injuries, it was estimated to be between \$4.1 million to \$9.6 million.

The estimated costs of pain and suffering for crime victims were shown to be much higher when the calculation was based on information from the GSS on victimization than when it was based on police statistics. The more conservative estimates were obtained based on the assumption that the fear experienced by crime victims did not entail life threatening injuries. The estimated cost of pain and suffering from all crimes, based on non-fatal injuries, was \$35.83 billion using the GSS data, compared to \$9.83 billion using police-reported statistics. The estimated cost of pain and suffering from violent crimes, based on non-fatal injuries, was \$20.43 billion using the GSS data and \$5.84 billion using police-reported statistics. For property crimes,

based on non-fatal injuries, it was \$15.04 billion using the GSS data and \$3.63 billion using police-reported statistics.

This study provides preliminary estimates of the cost of pain and suffering from different types of crime. Lack of available data, however, continues to be a major constraint encountered in this kind of analysis. The questions on safety in the GSS, for example, did not ask survey participants whether their worries about personal safety included worries about the loss of life. Logically, victims of violent crimes are more likely to be worried about life-threatening injuries than victims of other crimes. Victimization surveys with more carefully designed survey questions could lead to more precise estimations of the cost of pain and suffering.

The present study provides estimates of the cost of the pain and suffering of crime victims. The existence of crime, especially violent crime, is likely to instill fear in the general population as a whole. This implies that the total crime bill would be much larger if the fear of the general population were taken into account. Information from the GSS does not provide precise enough details to allow such additional costs to be estimated. To include an estimation of the cost of the pain and suffering resulting from each type of crime and borne by individuals who are not crime victims, specific questions would have to be included in the survey on whether an individual finds their personal safety at risk from a specific type of crime. Such information is not made available by the GSS on victimization.

In general, an estimation of the cost of the pain and suffering of crime victims requires precise information from a carefully designed victimization survey. Now that a methodology to estimate such cost has been developed, more effort should be devoted to designing better surveys that will lead to more precise cost estimates for various types of crime.



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