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**AN INTRODUCTION TO ECONOMIC
ANALYSIS IN CRIME PREVENTION:
THE WHY, HOW AND SO WHAT**

Cameron McIntosh and Jobina Li

Research Report: 2012-5

NATIONAL CRIME PREVENTION CENTRE / CENTRE NATIONAL DE PRÉVENTION DU CRIME

ACTING TO PREVENT
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La présente publication est aussi disponible en français. Elle s'intitule : Introduction à l'analyse économique de la prévention du crime : le pourquoi, le comment et les voies d'avenir.



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Abstract

Although evidence-based crime prevention has been identified as a priority in Canada's political and policy settings, very little is known about the economic efficiency of crime prevention programs in the Canadian context. This is an important issue given current fiscal constraints in this country and around the world. To that end, the objective of the following report is to provide an overview of two of the most widely-used economic approaches to assessing the costs and/or financial benefits of crime prevention programs. Cost-effectiveness analysis links program outcomes (e.g., crime reduction) to investment costs in order to estimate the per-outcome expense of a crime prevention project. Cost-benefit analysis takes this a step further and attaches monetary values to program outcomes, which are then compared to program costs in order to provide an estimate of the financial return on investment. Issues and challenges associated with each type of economic analysis approach are discussed, as well as recommendations for next steps.

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Foreword

The capacity for governments to identify and promote cost-effective measures is important for various reasons. First, because government interventions usually address intractable issues (such as crime and violence), numerous alternative responses will be possible, so choosing the most cost-effective one seems to be a reasonable strategy. Second, cost-effective measures generally have a higher likelihood of actually achieving their goals (such as preventing offending), because the capacity to determine cost-effectiveness depends on a rigorous impact evaluation having been conducted. And third, in a world of limited resources, and given the current requirement to control government expenses, helping decision-makers choose the most cost-effective alternative is sound public policy.

The National Crime Prevention Centre (NCPC) aims to help decision-makers reach informed decisions about the use of finite resources in crime prevention. As such, it develops knowledge of effective practices, in particular through conducting rigorous evaluation studies of the impacts of selected funded interventions. Some fourteen project-based evaluation studies are currently underway, and a first round of evaluation studies of youth gang prevention projects has just been completed. However, cost-effectiveness and cost-benefit analyses remain, to some extent, the more challenging aspects when assessing crime prevention programs.

For this reason, the NCPC has taken the first step towards bridging the knowledge gap by authoring this guide, which brings together an existing body of international knowledge on cost-effectiveness and cost-benefit analysis. This report was designed to be a standalone document to guide discussions at a roundtable on the same topic, which occurred in October 2011.

It is hoped that the information derived from the NCPC report and roundtable will promote and improve our understanding of the application of economic analysis to crime prevention programs. Greater familiarity with such an approach among a diverse array of partners and stakeholders will allow us to work collaboratively to support the development of economic analysis expertise in Canada, thus contributing to a sound planning and investment strategy with regard to crime prevention.

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Public Safety Canada

An Introduction to Economic Analysis in Crime Prevention: The Why, How and So What

1.0 Why use economic analysis in crime prevention?

The costs of crime to Canadian society are considerable, with the most recent estimate being a staggering \$100 billion dollars in 2008 (Zhang, 2011)¹. As such, crime prevention – which generally consists of “any preemptive intervention[s] intended to block or reduce: [1] the likelihood of the occurrence of a criminal act at a given location, or [2] the onset of criminal behaviour within an individual” – has been identified as a key priority in Canada’s political and policy environments (National Crime Prevention Centre (NCPC), 2007, 2008, 2009; Schneider, 2010, p. xv). In this country and internationally, a wide variety of crime prevention programs are being designed and implemented to decrease the likelihood of later offending. These programs are generally delivered via two main strategies: the direct targeting and mitigation of risk factors among children and youth, and/or the modification of the conditions and situations that may increase the probability of crime in schools and communities (International Centre for the Prevention of Crime, 2008; NCPC, 2008). The importance of the existence of such crime prevention programs cannot be understated, as crime prevention promotes public safety, advances social justice and contributes to sustainable development (United Nations Economic and Social Council, 2002).

However, in this era of rising criminal justice costs and competing priorities, the selection, implementation, expansion and continuation of crime prevention programs has come under closer scrutiny, and has prompted renewed interest in “results-based accountability” and evidence of “what works” (Karoly, Kilburn, Bigelow, Caulkins, Cannon & Chiesa, 2001; Welsh, 2007a). Therefore, there is increasing awareness and recognition among researchers, policy-makers and practitioners that crime prevention programs should be evidence-based, that is, founded on scientific research that demonstrates which strategies do and do not work to prevent crime (Welsh, 2007a, 2007b; Sherman, Farrington, Welsh, & MacKenzie, 2006). At the core of evidence-based programs is the systematic documentation and evaluation of their degree of effectiveness in achieving their intended outcomes, such as the extent of reductions in future crime and victimization, as well as positive changes in the attitudes, behaviours, social opportunities, and productivity of high-risk individuals (youth and adults) (Knutsson & Tilley, 2009). These outcomes could also include intergenerational effects, where preventing present antisocial/criminal behaviour in an individual may avert similar behaviour in their offspring (e.g., Moffitt & Caspi, 2003; Thornberry, Freeman-Gallant, Lizotte, Krohn, & Smith, 2003).

However, solid evidence of effectiveness yields only a partial picture of the potential societal benefits that crime prevention has to offer. Crime prevention programs are expensive to design and implement, so concerns about effectiveness must be balanced with concerns about fiscal reality. Consider the potential expenditures for a program that purports to change attitudes and behaviours in order to avert misconduct, delinquency, and criminality, or redesign physical environments (e.g., neighbourhoods, shopping malls, parks) to reduce crime. The Wraparound Surrey project, for example, in an effort to advance a comprehensive gang violence prevention strategy through the enhancement of social and problem solving skills in youth, cost an estimated \$1.2 million in 2009-10 for staff training, parental education, youth risk/needs assessment and other related activities (NCPC, 2010, 2011). Its partners include federal (e.g., Public Safety Canada), provincial (e.g., Ministry of Public Safety and Solicitor General) and municipal (City of Surrey) governments, as well as a host of law enforcement (e.g., Surrey Gang Task Force), criminal justice (e.g., Surrey Youth Justice Services) and community (e.g., YMCA) organizations. Clearly, crime prevention is a complex, multi-sectoral, multi-disciplinary undertaking, and in this context, it is evident that much larger initial financial investments are needed, even for small-scale community projects (U.S. National Crime Prevention Council, 2005). Thus, there is a legitimate expectation of a return on investment, in terms of reductions in crime-related costs that would be greater than the costs of the intervention.

Even if a particular prevention program significantly reduces crime and increases pro-social behaviour, it may not be immediately apparent if another program might be just as, or even more, effective at a lower cost, or whether the cost of implementation outweighs the ultimate financial benefits to society. Given the current budgetary constraints in Canada, the U.S., and numerous other countries around the world, these issues of economic viability have been brought increasingly to the forefront, as decision-makers continue to struggle with the quandary of which crime prevention programs to fund, expand, replicate, or discontinue (Cohen, 2000). In order to arrive at a balanced, impartial and equitable decision, they must identify policies and practices that are not only outcome effective, but also economically efficient. From this juncture, the natural progression is to determine “what’s worthwhile” (Welsh, Farrington, & Sherman, 2001); in other words, which programs will ultimately yield the most social benefits, or the greatest “return on investment”?

One decision-making tool that can provide this pecuniary assessment is economic analysis, which, in general, is a systematic, mathematical approach used to compare how well various alternatives meet a given set of objectives under certain assumptions and constraints. Economic analysis attaches quantitative values to constructs/components of interest in order to measure, in monetary terms, the costs and/or benefits of projects and initiatives (Marsh, Chalfin, & Roman, 2008; Welsh & Farrington, 2000). Because this approach encourages decision-makers to give serious thought and consideration to the goals, evaluations, and consequences of policies and programs, it introduces and instills a rationality into the decision-making process, and presents itself as a sound basis for informing project strategies and the allocation of finite resources (Sansfaçon, 2004). In addition, the fact that economic analysis is dependent on mathematical formulas means that it remains an impartial, transparent and accountable way of assessing economic efficiency.

The idea of using economic analyses is not a novel one, and has been used in a diversity of domains, for example, in business, health, politics, technology, law, labour, immigration, religion, and marriage. However, it is only in the last few decades that it has gained recognition and traction in the area of criminal justice. The first economic analysis studies began to surface in the late 1960s and early 1970s, and encompassed criminal justice-related topics such as: court sentencing (Hofler & Witte, 1979), correctional programs (e.g., Bloom & Singer, 1979), community correctional facilities (e.g., Gray, Conover, & Hennessey, 1978), prison building (e.g., Clear, Harris, & Record, 1982), community watch and policing programs (e.g., LeBlanc & Williams, 1978), police initiatives (e.g., Kirchner, Schnelle, Domash, Larson, Carr, & McNees, 1980), victim compensation (e.g., Jones, 1979), and so on. Around this same time period, crime prevention researchers (e.g., Minnehan, 1977) also started to assess the cost-efficiency of youth prevention/intervention strategies, with a marked rise in interest after Lipsey’s (1984) seminal study, in which he linked economic analysis with juvenile delinquency programs by using a benefit-cost model to assess a variety of youth programs in Los Angeles County². Other researchers (e.g., Aos, Barnoski, & Leib, 1998; Cohen, 1998) soon followed, applying economic analysis techniques to evaluating a range of prevention/intervention programs. More recently, the use of economic analysis techniques has also spread to situational crime prevention programs, for example, street lighting improvements (e.g., Painter & Farrington, 2001), alley gating (e.g., Bowers, Johnson, & Hirschfield, 2004), and close-circuit television (e.g., Welsh & Farrington, 2002).

An economic analysis exercise is typically centered around the issue of program affordability and/or measurable returns on investments, with the prerequisites being objective and accurate evaluations of the costs and/or benefits of different policies and interventions (Dossetor, 2011; Roman, Dunworth, & Marsh, 2010; Welsh et al., 2001). Rigorous methodological frameworks for economic analysis can provide useful comparative indicators to address these concerns, thereby contributing to the evidence base for informing decisions on the allocation of scarce societal resources across a broad array of crime prevention programs and initiatives (Welsh & Farrington, 2000). However, despite its potential as an evaluation tool, economic analysis of policies and programs in the crime prevention context is still a fairly underused approach. In addition, much of the existing work is heavily technical in nature and contained in academic

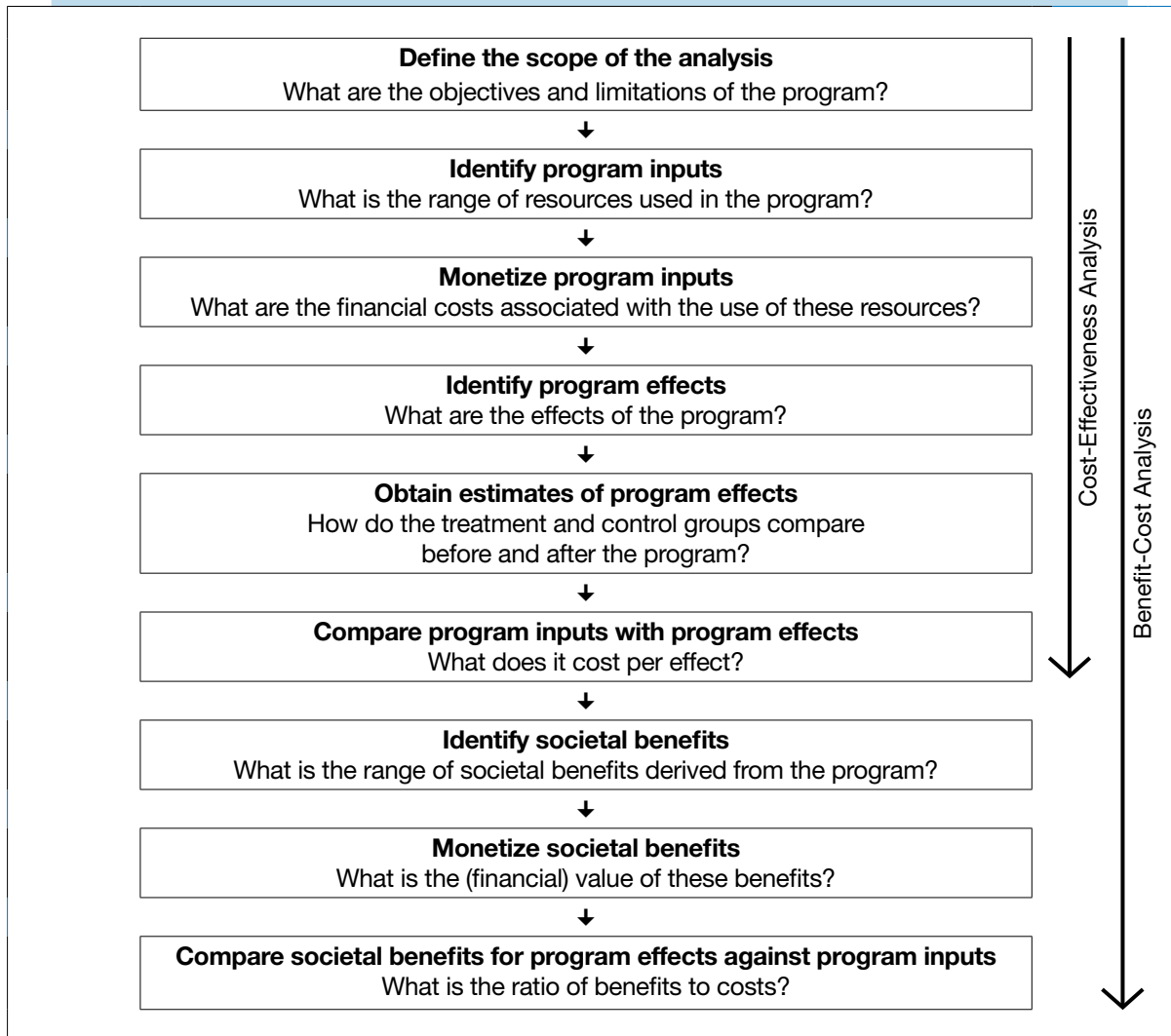
journals that are typically not accessed by policymakers and the general public, and can therefore be described as “hidden in plain sight” (Heaton, 2010, p. 18).

Presently, very little is known about the cost and economic efficiency of crime prevention programs in Canada. As such, the purpose of the current document is to introduce the concept of economic analysis in crime prevention to a diverse audience of policy-makers, crime prevention practitioners, program developers, researchers, educators, and civic and law enforcement leaders. This report provides a general, readable overview of the basic concepts, objectives and methods involved, and discusses various limitations and recommendations for conducting economic analyses. It is hoped that this report will contribute to an increased awareness, familiarity and comfort with this type of analysis, so that Canadian stakeholders can start to consider if, and what role, economic analysis can play in their program evaluations and decision-making. Lastly, the report also contains a variety of technical references for readers interested in developing more sophisticated knowledge and skills in this domain.

2.0 A guide to economic analysis: Overview of various approaches

Economic methods for evaluating crime prevention programs vary widely in analytical depth and sophistication (Marsh et al., 2008). Two³ major economic analysis approaches are described in the following sections: cost-effectiveness analysis, and benefit-cost (or cost-benefit) analysis, with the latter approach incorporating and extending the features of the one before, in order to provide a more comprehensive economic perspective on a given policy or program. In general, the main steps for conducting a cost-effectiveness and/or benefit-cost analysis are outlined in Figure 1, with explanations to follow in the following sections (for a more technical account, see Barnett, 1993; Dhiri & Brand, 1999).

FIGURE 1. STANDARD PROCEDURES FOR CONDUCTING ECONOMIC ANALYSIS



*Note: adapted from Barnett, 1993; Chisholm, 2000; Dhiri & Brand, 1999; Juvenile Justice Evaluation Center (JJEC), 2002; Levin & McEwan, 2001; Welsh & Farrington, 2000).

2.1 Cost-effectiveness analysis: How much does it cost to get an effect?

A cost-effectiveness study collects information on program costs and effectiveness (outcomes), then establishes explicit mathematical connections between these variables in order to calculate how much money was spent to achieve these specific outcomes (Marsh et al., 2008; Levin & McEwan, 2001). The result is a statistic called a cost-effectiveness ratio (CER):

$$\begin{aligned}
 \text{Cost-Effectiveness Ratio} &= \frac{\text{Total Program Cost}}{\text{Net Effects of Program}} \\
 &= \frac{\text{Total Program Cost}}{\text{Effect}_{\text{Intervention}} - \text{Effect}_{\text{Control}}}
 \end{aligned}$$

2.1.1 Total Program Cost

The total program cost relies on a technique known as cost analysis to determine the sum of all financial inputs to the crime prevention program in terms of administrative costs, capital costs and indirect costs (see Table 1 for examples).

$$\text{Total Program Costs} = \Sigma (\text{Administrative costs, Capital costs \& Indirect costs})$$

TABLE 1. EXAMPLES OF ADMINISTRATIVE, CAPITAL AND INDIRECT COSTS

Type of costs	Examples
Administrative costs	Staff salaries, benefits, and training activities
Capital costs	<ul style="list-style-type: none"> • Purchase or rental of office space, equipment, and supplies, insurance, vehicles, transportation • Costs attributable to clients such as books, training, and assessment materials • “In-kind” costs, e.g., office space provided by a hosting agency which runs several programs
Indirect costs	Administrative and client service volunteers (whose costs could come out of their own pockets or be contributed by a partnering or sponsoring agency)

*Note: Hornick, Paetsch & Bertrand, 2000; Kerr, 2001.

Although detailed program costs are useful for accounting, auditing, and replication purposes, they cannot speak to the actual impact of crime prevention programs, because they usually include no outcome measures (e.g. reductions in criminal activity), or do not systematically link outcome measures to program investments (Roman & Farrell, 2002). Therefore, the second part of the CER relies on an assessment of the program’s effectiveness.

2.1.2 Net Effects of Program

The part of the equation (in the denominator) called the “Net Effects of Program” means that program outcomes are always measured relative to what occurs in some alternative situation, within a specified time period (Levin & McEwan, 2001). First, in order to measure program effectiveness, a researcher generally tries to quantify the extent to which the program ultimately accomplished the goals that it initially set out to achieve. Often, effectiveness outcomes include an estimate of how many crime incidents were avoided due to implementation of the program, and may include other related gains such as increases in legitimate opportunities and pro-social attitudes, values, and behaviours on the part of the program participants (Cohen, 2000).

2.1.3 A stylized example of a cost-effectiveness analysis

Suppose that Government X was interested in the cost-effectiveness of a new problem-oriented policing program, Program A, for preventing motor vehicle thefts in high-crime areas of a large city (see Table 2 for a summary of the following example). Having invested \$300,000 into this program, they wish to investigate if this was an efficient use of funds, and have commissioned a team of evaluators to determine the net effects of this policing program. Using police statistics and victimization reports, the evaluators record the number of auto thefts occurring during the time when the program was administered, and for five years following its conclusion (see Schneider, 2010). This data was collected for both the neighbourhood(s) where the program was implemented (the intervention areas) and other matched areas which received no program (the control areas). In this scenario, the “net effects of program” is simply the

difference in the number of auto thefts between the intervention and control areas, during the specified evaluation time frame.

To further this example, suppose that the evaluators, at the end of the study, find that 10 auto thefts occurred in the intervention areas, but that there were 60 auto thefts in the control areas. In effect, 50 auto thefts were prevented by the program, resulting in the following cost-effectiveness ratio:

$$\begin{aligned} \text{Cost-Effectiveness Ratio} &= \frac{\$300,000 \text{ Program Cost}}{50 \text{ Auto Thefts Prevented}} \\ &= \$6,000 \text{ per Auto Theft Prevented} \end{aligned}$$

Therefore, on average, \$6,000 of program costs had to be expended in order to prevent each of the 50 auto thefts that would have occurred in the absence of the program.

TABLE 2. SUMMARY OF A STYLIZED COST-EFFECTIVENESS ANALYSIS EXAMPLE

Program A	
Total Costs (sum)	\$300,000
• Administrative costs	\$215,000
• Capital costs	\$75,000
• Indirect cost	\$10,000
Net Effects (difference)	50 auto thefts
• Outcome – intervention group/area	10 auto thefts
• Outcome – control group/area	60 auto thefts
Cost-Effectiveness Ratio	\$6,000

Given that cost-effectiveness analysis allows for comparisons to be made between program costs and outcomes (e.g., an investment of X program dollars prevents Y number of crimes), crime prevention programs can be ranked in terms of their cost-effectiveness ratios to help inform decision-making⁴ (Welsh & Farrington, 2000). In this sense, cost-effectiveness analysis can provide information on relative comparisons – is a particular program alternative relatively more cost-effective than another (Levin & McEwan, 2001)? To extend the example above, if stakeholders are faced with the decision as to whether to continue funding three auto-theft programs – Program A (with a CER of \$6,000), Program B (with a CER of \$7,000) or Program C (with a CER of \$2,000) – all other factors being relatively equal, the most cost-effective program would clearly be C, as it can prevent an incidence of auto-theft for only \$2,000. In general, the lower the cost-effectiveness ratio, the more cost-effective a program is, and the default decision is generally to select the alternative with the lowest costs per unit outcome, while taking into account possible differences in measurement scales (Levin & McEwan, 2001).

However, even though the cost-effectiveness ratio goes beyond simple cost estimation to indicate if program funds have been spent efficiently, a program’s absolute worth cannot be determined through such means, as cost-effectiveness analysis fails to take into consideration the range of possible benefits to society, nor does it attach a dollar value to these benefits (Levin & McEwan, 2001). Therefore, it does not provide any information regarding the return on investment, or the amount of money saved to society by preventing crimes. In other words, a “cost-effectiveness analysis may help one decide among competing program models, but it cannot show that the total effect was worth the cost of the program” (Weinrott, Jones & Howard, 1982, p. 179). As such, cost-effectiveness analysis can be thought of as an “incomplete” benefit-cost analysis (Welsh & Farrington, 2000).

2.2 Benefit-cost analysis: How much does society save per dollar invested?

Benefit-cost (or cost-benefit) analysis goes an additional step beyond cost-effectiveness analysis to ask, “How economically efficient are our prevention programs in reducing crime?” or “Has the money been well-spent?” (Dossetor, 2011, p. iii; Marsh et al., 2008; Zedlewski, 2009). The concept of economic efficiency is usually applied to organizations such as banks, firms, and corporations, where one wants to know the ratio of expenses to the amount of revenue generated (typically on an annual basis). In all areas of social policy and private business, benefit-cost analysis tries to place monetary values on benefits (savings) resulting from a program or project, then compares the total value of the benefits with the total costs. Unlike cost-effectiveness analysis, which only looks at monetized costs to determine efficiency, benefit-cost analysis takes into account both monetized costs **and** benefits. In doing so, a benefit-cost analysis integrates economic principles with the impact evaluation of a crime prevention program, so as to see if the total societal benefits outweigh the costs of implementing and sustaining the program (Levin & McEwan, 2001). This results in an equation known as the benefit-cost ratio (BCR)^{5,6,7}, which is unit-independent:

$$\begin{aligned} \text{Benefit-Cost Ratio} &= \frac{\text{Averted Societal Costs} \times \text{Net Effects of Program}}{\text{Total Program Cost}} \\ &= \frac{\text{Potential Societal Savings} \times \text{Net Effects of Program}}{\text{Total Program Cost}} \\ &= \frac{\text{Total Societal Benefits}}{\text{Total Program Cost}} \end{aligned}$$

In the crime prevention context, this formula would be conceptualized as:

$$\text{Benefit-Cost Ratio} = \frac{\text{Averted Societal Costs (per crime)} \times \text{Net Effects of Program (crimes averted)}}{\text{Total Program Cost}}$$

2.2.1 Total Program Cost & Net Effects of Program

For benefit-cost analysis, the variables “Total Program Cost” and “Net Effects of Program” are essentially calculated using the same method as that for cost-effectiveness analysis (Levin & McEwan, 2001). As such, readers are asked to refer to Sections 2.1.1 and 2.1.2.

2.2.2 Societal Savings/Benefits⁸

In the crime prevention context, the benefits (revenues) are the total savings to society resulting from program-related reductions in crime. For example, considering that the average societal costs (from birth) of a high-risk youth is in the range of USD\$2.6 to USD\$4.4 million⁹, if crime prevention programs can avert or reduce criminal offending, a principal economic benefit is future savings in terms of all the crime-related costs that would have otherwise accrued in the absence of such programs (Cohen & Piquero, 2009). Thus, a core feature of benefit-cost analysis in crime prevention is the straightforward equating of economic benefits with the costs of all avoided crimes under a particular policy or program, in order to calculate monetary indicators for judging the relative cost-efficiency of different alternatives.

In addition to the savings associated with crime prevention/reduction due to such programs (e.g., lower costs to the criminal justice system, victims and society through reduced crime), there are also benefits in a variety of other areas, for example: reductions in welfare assistance, decreased need for special

education, and increases in income tax revenue from the higher wages of participants (due to improved educational attainment) and so on (Homel, Freiberg, Lamb, Leech, Carr, Hampshire, Hay, Elias, Manning, Teague, & Batchelor, 2006). Early intervention with high-risk youth can not only divert them away from a life of crime, but steer them toward legitimate opportunities and careers (Welsh & Farrington, 2000). As such, benefit-cost analyses should systematically incorporate detailed information on the expenditures involved in achieving program targets, and/or the estimated savings that the program generates for society, as a function of the number of crimes prevented, increases in positive outcomes (e.g., education, earnings), and societal participation by high-risk individuals. Last, but not least, it is important to note that a number of studies have found cost savings to be crime-specific (e.g., Aos, Phipps, Barnoski, & Lieb, 2001; Cohen, Rust, Steen, & Tidd, 2004; Dubourg, Hamed, & Thorns, 2005; Farrington, Ditchfield, Hancock, Howard, Jolliffe, Livingston, & Painter, 2002; Miller, Cohen, & Wiersema, 1996). Therefore, when computing societal benefits for benefit-cost analyses, crime typology should be taken into consideration.

Issue 1: What are the kinds of societal costs (potential savings)?

The costs of crime arise from a wide variety of specific impacts at the individual, family, community, and national levels, and span victims and their families/friends, communities, the criminal justice system, as well as offenders and their families (Cohen, 2005; Cohen & Bowles, 2010). However, it is far easier to quantify some costs than others. Tangible costs (i.e., criminal justice system costs, victim costs, and crime career costs) are those that involve monetary payments, end up being tallied in the gross national product and/or are normally included in estimates of aggregate or individual wealth. Intangible, or non-monetary, costs are those not normally exchanged in private or public markets (McCollister, French & Fang, 2010). Examples of tangible and intangible costs are provided in Table 3.

TABLE 3. EXAMPLES OF TANGIBLE AND INTANGIBLE COSTS OF CRIME

Tangible		
<p>Criminal justice system costs</p>	<p>Police and investigative costs Prosecution Courts Victim’s time Jury’s and witness’ time Legal fees: <ul style="list-style-type: none"> • Public defenders • Private Legal costs associated with tort claims Corrections: <ul style="list-style-type: none"> • Adult corrections • Youth corrections Non-incarcerative sanctions Criminal Code Review Board</p>	<p>Victim services: <ul style="list-style-type: none"> • Victim service organizations • Victim compensation programs Other expenditures: Precautionary expenditures / efforts Other non-criminal programs: <ul style="list-style-type: none"> • Hotlines and public service announcements • Community treatment programs • Private therapy/ counseling • Neighbourhood watch and community prevention programs </p>

TABLE 3. EXAMPLES OF TANGIBLE AND INTANGIBLE COSTS OF CRIME (CONTINUED)

Victim costs: <i>Direct economic losses suffered by crime victims</i>	Medical and mental health care: <ul style="list-style-type: none"> Charges not reimbursed by insurance Charges reimbursed by insurance Administrative overhead of insurance Direct property losses: <ul style="list-style-type: none"> Losses not reimbursed by insurance Losses reimbursed by insurance Administrative costs: insurance reimbursement Victim services: <ul style="list-style-type: none"> Victim's time Expenses charged to victim Expenses paid by agency Temporary labour and training of replacement Psychological injury treatment 	Productivity losses: <ul style="list-style-type: none"> Lost workdays: <ul style="list-style-type: none"> Lost wages for unpaid workdays lost Lost productivity for paid workdays Lost schooldays: <ul style="list-style-type: none"> Foregone wages due to lack of education Foregone nonpecuniary benefits of education Foregone social benefits due to lack of education Lost housework Other expenses: <ul style="list-style-type: none"> Funeral and burial expenses
Crime career costs: <i>Opportunity costs associated with the choice to engage in illegal rather than legal and productive activities</i>	Incarcerated offender: <ul style="list-style-type: none"> Lost wages Lost tax revenue and productivity 	

Intangible		
Victims (family and friends):	Pain and suffering Decreased quality of life Loss of affection/enjoyment (victims, family members) Death (value of life) Fear of crime Emotional/psychological distress	
Offenders:	Incarcerated offender: <ul style="list-style-type: none"> Value of lost freedom Psychological cost to family 	

*Note: adapted from Cohen, 2000; McCollister et al., 2010, Zhang, 2011.

Equally relevant is the methodology used to calculate these cost elements. Although it is relatively straightforward to estimate certain types of more concrete or “tangible” crime costs (e.g., criminal justice system expenditures, the value of stolen goods and damaged property, etc.), it is much more problematic to place an accurate value on many other “intangible” impacts, such as lost educational achievement, decreased earnings/tax revenue, substance use, loss of social cohesion in a high-crime community, the impact on the life of family members of homicide victims, or the pain, suffering and stigma of children who grow up with incarcerated parents (Department of Justice Canada, 2005; Reynolds, Temple, Robertson, & Mann, 2001; Sansfaçon, 2004). For these reasons, estimates of the total costs of crime will often understate the true economic impact of crime, and in turn, estimates of the economic benefits produced by preventing crime will often correspondingly underestimate the cost-efficiency of policies and programs. Therefore, the next section provides an overview of the statistical methods for assigning monetary values to particular crimes.

Issue 2: How are the costs of crime calculated?

To conduct benefit-cost analyses that properly assess the cost-efficiency of prevention programs, accurate crime cost estimates are required. However, assigning a monetary value to the various impacts of crime is a complex task, and often many assumptions need to be made in the absence of hard data on multiple components. As such, there is generally no real “right or wrong methodology” for computing the costs of crime (Moolenaar, 2009, p. 312). The choice of technique is usually dictated by a combination of the purpose of the analysis (i.e., which costs are to be included) and data availability. All approaches have their merits and limitations, and the onus is on analysts (and those using the results for policy purposes) to be completely transparent about their choices, data sources, and any shortcomings of the method that may limit the usefulness of (but not necessarily totally invalidate) the results. The next few subsections provide an overview of three methods for computing the costs of crime: a) the “bottom-up” approach; b) the “top-down” approach; and c) the “break-down” approach.

a) The “bottom-up” approach

The bottom-up approach is currently the most popular method for computing the costs of crime, and relies on a simple accounting formula that adds up all the direct and indirect losses from crime (Cohen, 2005; Cohen & Bowles, 2010; DeLisi, Kosloski, Sween, Hachmeister, Moore, & Drury, 2010; McCollister et al., 2010). Bottom-up cost calculation requires the following four essential pieces of information: (1) a clear definition of the offences or offence categories being studied, based on criminal codes and/or the nature (e.g., severity) of the offence; (2) the number of incidents of each offence in a given time frame, as obtained from a combination of police-reported data and victimization surveys; (3) detailed knowledge of how, and to what degree, crime affects the various relevant domains (i.e., victims and their families, communities, the criminal justice system, as well as offenders and their families); and (4) reliable data sources and statistical techniques for assigning a dollar value to, or “monetizing,” each of those consequences. As an example of the bottom-up approach, assume that the average cost of one residential burglary event in Canada is \$6,500¹⁰. Given that the number of recorded burglary¹¹ incidents was 196,881¹² in 2010, the total cost of burglary in Canada is approximately \$1.3 billion dollars (\$1,279,726,500¹³) annually.

This data-gathering and analysis process is extremely tedious and intensive, as it must span policing, court, and corrections budgets, victim services, compensation, and health care costs, precautionary expenditures by individuals and businesses, as well as the financial impact of foregone legitimate earnings, opportunities and productivity for both victims and offenders, to name just a few of the necessary sources of information. Furthermore, these costs must be partitioned among specific crimes using statistical modelling. Some crimes will certainly result in higher costs than others because they have more numerous and severe effects on individuals, the criminal justice system and society at large. The cost of a single vandalism incident, for example, is estimated at USD\$4,860. This stands in stark contrast to the cost of an aggravated assault, which is valued at USD\$107,020, more than 20 times higher (McCollister et al., 2010). Thus, for planning and priority-setting purposes, decision-makers are often interested in the costs of particular offences, and not just the overall economic burden of crime. However, there have been numerous critiques of the bottom-up approach to estimating the costs of crime, most notably that it can never hope to exhaustively cover all conceivable costs due to frequent data limitations (e.g., unreported crime¹⁴ and frequent data shortages for certain types of offence impacts, especially pain, suffering, and fear) and therefore will always underestimate the cost of crime (Cohen, 2005; Cohen & Bowles, 2010). Thus, lack of appropriate data and disagreements on the specific assumptions about the opportunity costs of the lost resources constitute the main limitations to this type of calculation (Fajnzylber, Lederman, Loayza, 2000).

b) The “top-down” approach

Given the shortcoming that all bottom-up cost of crime studies will inevitably understate the total financial impact of crime to some degree, another method that is sometimes used is called “willingness-to-pay” (Cohen et al., 2004). This technique attempts to be more comprehensive than the bottom-up approach by essentially starting from the “top-down.” Specifically, rather than combing through myriad data sources to tally up the societal costs of crime, a representative sample of the general public is surveyed to find out how much they would be willing to pay for alternate programs (e.g., Nagin, Piquero, Scott & Steinberg), general reductions in overall levels, or specific types, of crime (e.g., Cohen et al., 2004), or to protect against the threat of victimization (e.g., Piquero, Cohen, & Piquero, 2011; Soeiro & Teixeira, 2010). The values are then totalled across all respondents in order to produce an estimate of the overall societal willingness-to-pay for reduced crime, which is taken to be the societal costs of crime as stated by the public itself. An example of this method in action is the 2004 study by Cohen and colleagues, during which they surveyed over a thousand community members. Each resident was asked how much they would be willing to pay to reduce crime¹⁵ in their neighbourhood by ten percent, and on average, each household was willing to pay between \$100 and \$150 annually to achieve this goal. Cohen et al. (2004) then deconstructed the estimates to calculate the total cost of each type of crime. As a group, the residents were willing to contribute the most money to reduce the murder rate, thus making murder the most costly crime at \$11.4 million per offense. Burglary was the least costly offense type at \$30,197 per burglary event.

The approach assumes that when people provide their willingness-to-pay estimates, they have thought through all of the various domains of crime costs, and are stating up front what they would be willing to pay to collectively avoid these costs associated with crime. This may not be a tenable assumption in all cases. Furthermore, it is very difficult, if not impossible, to break willingness-to-pay values down into the component costs of crime, which may be relevant to different stakeholders (e.g., government departments, policing and corrections agencies, victims and community organizations, etc.), whereas the bottom-up approach takes these into account from the start.

c) The “break-down” approach

In certain cases, total budgets (e.g., for criminal justice system agencies) may be the only source of financial information available for computing the costs of crime. In such a situation, a reasonable option may be to use a “break-down” approach to crime costing (Moolenaar, 2009). This method takes a total budget as the starting point, filters out costs for all non-crime-related activities, and then uses administrative data on crime-related activities (e.g., number of cases and staff, output, products) to deconstruct the crime-specific portion of the budget into costs by crime type. For example, 2008 police expenditures in Canada totalled over \$11 billion; however, not all of the money was spent directly on criminal investigations. In fact, an estimated 25% of police expenditures were directed towards non-crime related activities, with the remaining \$8.5 billion being spent on activities directly related to crime control (Zhang, 2011).

Generally, applications of the method focus mainly on criminal justice system costs, and thus typically miss the wider array of victim, community, and offender costs. Breaking down other types of organizational budgets – victim services, health care, and compensation – in the same manner may provide additional costs of crime information, but this strategy is rarely, if ever, used.

2.2.3 A stylized example of a benefit-cost analysis

To further illustrate the basic ideas involved in benefit-cost analysis, recall the auto theft scenario introduced in Section 2.1.3. As previously discussed, the implementation of the new problem-oriented policing program (Program A) costs \$6,000 in program expenditures to avert one incidence of auto theft. Now, the initial analysis will be expanded to include the amount of money that society (or the taxpayers) saves by preventing those thefts. Thus, a benefit-cost analysis will provide an estimate of what it is worth

to prevent the occurrence of a single auto theft in terms of the spectrum of victim, criminal justice, and lost offender productivity costs (see Table 4 for a summary).

McCollister et al. (2010) recently estimated the total cost of an auto theft to be USD\$10,772 in 2008 dollars (assuming that the crime is reported and the offender is arrested, tried and administered punishment). Because crime savings are defined simply as the societal costs that would have been incurred if the crimes prevented by the program had actually taken place, the benefit-cost ratio in the present example would be calculated as follows:

$$\begin{aligned}
 \text{Benefit-Cost Ratio} &= \frac{\$10,772 \text{ in Averted Societal Costs per Theft} \times 50 \text{ Auto Thefts Prevented}}{\$300,000 \text{ Program Cost}} \\
 &= \frac{\$10,772 \text{ in Potential Societal Savings per Theft} \times 50 \text{ Auto Thefts Prevented}}{\$300,000 \text{ Program Cost}} \\
 &= \frac{\$538,600 \text{ Societal Benefits}}{\$300,000 \text{ Program Cost}} \\
 &= \frac{\$1.80 \text{ Societal Benefits}}{\$1 \text{ Program Cost}} \\
 &= 1.80
 \end{aligned}$$

This calculation conveys the fact that each dollar invested in Program A is ultimately worth \$1.80 in savings to society from averted auto thefts. In other words, there is an 80 percent societal return on the initial crime prevention investment, which means that this particular crime prevention program will eventually pay for itself.

TABLE 4. SUMMARY OF A STYLIZED BENEFIT-COST ANALYSIS EXAMPLE

Program A	
Total Benefits [Societal Savings (per crime) x Net Effects]	\$538,600
Societal Savings (per crime)	\$10,772
Tangible costs (cost to criminal justice system/victims, cost of a criminal career)	\$10,534
Intangible costs (risk of homicide)	\$262
Net Effects (difference)	50 auto thefts
Outcome – intervention group/area	10 auto thefts
Outcome – control group/area	60 auto thefts
Total Costs (sum)	\$300,000
Administrative costs	\$215,000
Capital costs	\$75,000
Indirect cost	\$10,000
Benefit-Cost Ratio	1.80

Of course, the above example is purely hypothetical and serves only to illustrate the key basic concepts; it does not necessarily reflect the input costs and typical financial gains that can be expected from an actual auto theft reduction program or other types of crime prevention programs. Nevertheless, it does demonstrate the utility of benefit-cost analysis for ranking crime prevention program alternatives

according to their effectiveness per dollar of expenditure, which can help justify decisions about which programs to support in times of fiscal constraints and numerous, seemingly worthy policy options.

Ideally, decision-makers should seek out alternatives that involve interventions which minimize costs and maximize benefits to society. Programs that have a benefit-cost ratio (BCR) of greater than 1.0 are generally regarded as a worthwhile investment with a positive “rate of return.” In other words, for every dollar invested in the program, there will ultimately be a net gain in benefits. The higher the BCR, the greater the return on investment¹⁶. Conversely, BCRs of less than 1.0 indicate that there are negative returns on investment – the cost of program implementation far outweighs the benefits that are derived (Levin & McEwan, 2001).

2.2.4 Issues with cost estimations in benefit-cost analysis

Benefit-cost analysis is far from a foolproof technique, and must be conducted with precision and judged carefully. The information required is not easy to obtain and evaluate, and furthermore, it is critical to determine exactly whose ultimate benefits will be considered as part of a benefit-cost analysis. Therefore, when conducting benefit-cost analysis or using its results for decision-making purposes, it is critical to think about two interrelated issues: (1) exactly who will be most affected by the choices made, and (2) the particular methods, assumptions, and data used to compute the costs of crime. This subsection provides an overview of the limitations and issues of contention when conducting a benefit-cost analysis in crime prevention.

Given the vast array of societal costs (Table 3), there exists an almost infinite number of combinations when selecting which cost elements are relevant or should be included in an economic analysis study. This lack of standardization results in high variability in benefit-cost ratios (Farrell, Bowers & Johnson, 2004; Welsh & Farrington, 2000). For example, because the cost/benefit estimations vary depending on the assumptions and parameters of the study, assigning disparate values to the cost of the pain and suffering of crime victims can greatly affect the results of a benefit-cost analysis. If one ascribes the value of a human life to be \$9.6 million (in 1999 dollars), then the costs (and potential savings) are greater than if that same life is valued at \$4.1 million (Leung, 2004)^{17,18}. One might also question if the life of a persistent violent criminal is worth the same (in dollars) as a law-abiding citizen? What about an adolescent drug dealer or an elderly citizen? Although it may be simple to estimate the average cost of a lost life, it is often difficult to reconcile these figures when dealing with individual cases (Roman & Farrell, 2002). As such, they suggest presenting outcome data using confidence intervals rather than single figures.

Issue 1: Should intangible costs of crime be included in a benefit-cost analysis?

Another of the major debates in the area of economic analysis continues to be whether intangible costs should be included in a benefit-cost analysis. As previously discussed, tangible costs typically include the more obvious costs of crime such as criminal justice costs, medical expenses, lost wages, and victim assistance programs. Unfortunately, it is more difficult to assign a monetary value to intangible costs such as pain, suffering and lost quality of life (McCollister et al., 2010; Roman & Farrell, 2002)¹⁹. As such, the latter are more likely to be forgotten or left out of cost-related analyses. However, according to Farrell et al. (2004), omitting intangible costs from such an exercise not only trivializes or ignores the experience of victims, but it can also produce potentially misleading results. For example, if an evaluator limits their analysis to only tangible costs, it would appear that the cost of an average burglary exceeds the cost of a rape, a notion that seems incomprehensible. However, once the intangible costs are taken into account, a rape crime is, on average, 62 times more costly than a burglary, a perspective which seems more intuitively defensible (Farrell et al., 2004). In general, intangible costs account for the majority of the costs incurred by victims of crime and the costs of crime. For example, in 2008, the tangible cost of crime in Canada was over \$31 billion. However, when intangible costs of crime were included, the total cost of crime increased to over \$99 billion, meaning that intangible costs alone accounted for over \$68 billion²⁰ (Zhang, 2011).

Issue 2: Who bears the cost of crime?

The other issue that is at the forefront is the question of who bears the cost of crime. In the aftermath of a crime, victims may encounter the costs of medical care, lost wages, lost work/school days, property loss and damage, victim support and counselling, as well as more intangible, yet still highly significant personal losses stemming from pain, suffering, fear, and lost quality of life which, in turn, can seriously affect the lives of coworkers and family members (Leung, 2004). The extent to which some of these types of costs are ultimately borne by victims, as opposed to society as a whole (e.g., federal/provincial/territorial governments, citizens, taxpayers), depends on a number of personal and contextual factors.

First, differences among countries with regard to health care systems (e.g., universal versus private insurance) and victim services coverage (extent of government versus individual contributions), as well as between employers in terms of compensatory leave entitlements and medical insurance, will certainly modify the direct financial impact of crime on victims, but would not change the total societal cost of crime because the burden is simply displaced onto other parties (e.g., taxpayers at large, private and public sector employers). Moreover, for crimes that are unreported to police, the direct financial cost to victims would generally be much higher, as this would preclude potential avenues of compensation (e.g., from insurance companies, employers, and jury awards).

Second, crime is damaging to communities as a whole. In a social sense, it can reduce neighbourhood cohesion and satisfaction, and cause individuals (especially victims) and businesses to move to different areas that they believe to be safer. In a monetary sense, it can reduce property values in certain neighbourhoods and exert a negative effect on economic activity (Leung, 2004). For example, acts of vandalism in a community can promote fear and may be interpreted by potential home buyers as signs of community instability and neighborhood deterioration (Gibbons, 2004; Ihlanfeldt & Mayock, 2010). As a result, those wishing to sell their homes may be forced to reduce their asking price in order to attract buyers. Crimes against property, such as vandalism and burglary, can raise the cost of doing business in a community, whereas crimes against persons (particularly employees and customers) may discourage community members from working for or utilizing neighborhood businesses (Bates & Robb, 2008; Porter, 1995). Additionally, financial institutions may be hesitant to lend money to businesses in high crime areas, and insurers tend to charge higher rates for these clients as well (Craig, Jackson, & Thomson, 2007; Immergluck, 1999; Squires, 1999; Yoon, 1997).

Third, the costs of formal responses to crime are a heavy and constant drain on municipal, provincial, and federal governments. Across the spectrum of criminal justice system processes from policing to rehabilitation, taxpayers must shoulder the financial burden of an offence, including the expenses for investigating the crime, locating and arresting suspects, compensating jurors and witnesses for their time, charging and prosecuting (and sometimes defending) the accused, trying the case in court, pre-trial and post-trial incarceration, correctional programs, as well as parole and probation services (McCollister et al, 2010; Welsh, Loeber, Stevens, Stouthamer-Loeber, Cohen & Farrington, 2008). In 2008, the total criminal justice expenditures in Canada were an estimated \$15 billion. This included the operating costs of police, the courts, the prosecution and corrections, but not the \$238 million in third party expenditures, such as victim services and compensation (Zhang, 2011).

Fourth, in addition to the costs of dealing with crimes that have already happened, there are considerable costs incurred in *anticipation* of crime. In particular, these costs relate to a wide variety of basic safety measures taken by both individuals and organizations to avoid crime, such as home security systems, guard dogs, car alarms, and security staff. These types of costs have been referred to as “defensive expenditures” in the literature (Brand & Price, 2000). Furthermore, fear of crime can lead people to engage in precautionary behaviours, such as avoiding certain walking routes and other areas they perceive as dangerous (Brand & Price, 2000). This could cost them both the time potentially spent on more productive and enjoyable activities (i.e., “opportunity costs” of engaging in avoidance behaviours), and possibly involve monetary expenses, such as taking a taxi rather than walking.

Lastly, some experts have drawn attention to the societal costs of what could be called the “wasted potential” of an offender, a perspective which assumes that offenders would, on average, be productive members of society and actively contribute to social welfare if they were not engaging directly in criminal activities, or undergoing the associated punishments and rehabilitation measures (Cohen & Bowles, 2010; McCollister et al., 2010). Incarceration, for example, limits the present and future earnings of an individual during and after their sentence is complete; it not only stigmatizes individuals, but for many offenders, the time spent away from the community can result in deterioration of unused skills, the loss of social/professional networks, and the adoption of attitudes and behaviours that are counterproductive to the workplace environment (DeFina & Hannon, 2010). Impacts of prolonged incarceration include lower potential wages, reduced opportunities for advancement, and overall dismal employment prospects (DeFina & Hannon, 2010; Pager, 2003; Western, 2006; Pettit & Western, 2004; Western, Kling, & Weiman, 2001).

Related damages are also experienced by the offender’s friends and family, who must bear both the financial and psychological impact of events such as arrest, trial, and incarceration. Such costs directly affect the individuals who have been imprisoned, as well as the families and communities from which the offender was removed (DeFina & Hannon, 2010). Most incarcerated offenders are the breadwinners for their families at the time of their arrest, and contribute significantly to their families’ income (Mumola, 2000). Regardless of whether the income is legitimate, incarceration removes that vital monetary source of funds from the offender’s family (Oliver, Sandefur, Jakubowski, & Yocum, 2005; Western & Beckett, 1999). Parental incarceration may also have negative effects on children in the family, with studies showing that offspring of imprisoned individuals are more likely to exhibit antisocial behavior and mental health problems, as well as engage in criminal activity (Murray, Farrington, Isekol, & Olsen, 2009; Murray, Jansen, & Farrington, 2011). Therefore, costs associated with the potential future offending of the offender’s children must also be considered. Last, but not least, incarceration can negatively impact the economic prospects of entire communities. If an increasing number of community members have to cope with the burden of lost income, the resulting decreases in local spending will result in fewer local businesses being able to employ members of the community, creating a downward spiral of financial hardship (DeFina & Hannon, 2010).

For policy-makers and other potential consumers of benefit-cost analysis research in crime prevention, it is important to have a basic understanding of both the possible range of crime costs and how they are derived. For broad planning purposes, the total societal costs across all areas impacted by crime are obviously the optimal choice when doing a benefit-cost analysis of program-related savings, because the economic benefits of averted crimes are relevant to all consumers of crime prevention. In other words, the *ideal* benefit-cost analysis examines taxpayer returns on investment, in terms of benefits for society as a whole. However, existing benefit-cost analyses often do not focus on all possible savings, due to lack of sufficient data on the costs of crime, or possibly because the analysis is only aimed at addressing narrow stakeholder interests. Because many benefit-cost analysis studies include only a subset of the possible crime costs, the uninformed user may be left with misleading impressions of the relative cost-efficiency of different crime prevention programs. Therefore, it is crucial that benefit-cost analyses in crime prevention list all of the included and omitted cost elements, in order to give readers an unbiased picture of the scope and parameters of the study.

Issue 3: How do we measure costs?

Besides the lack of standardization in how program and societal cost items are identified, there is also the challenge of how these costs are measured. Specifically, the question of whether to rely on local or national estimates is an important one and must be addressed (Farrell et al., 2004; Haapanen, Goodman, Cordon & O’Brien, 2009). In assessing a local crime prevention/reduction program, analysts have to bear in mind that costs/benefits may be locality-dependent due to demographic and social factors (e.g., population distribution, income levels, unemployment rates, economic activity), policy decisions (e.g., policing strategies, availability of health services) and other related considerations. In the United Kingdom

(U.K.), for example, the costs of crime vary by boroughs in London, ranging from an estimated £215 per person in Richmond Upon Thames, to £620 in Westminster (Sinclair & Taylor, 2008). Although similar data do not currently exist for Canada, it is quite conceivable that the costs/benefits of crime prevention also differ by city (e.g., Iqaluit in comparison to Toronto). Given that crime costs may differ substantially between different settings, and that local and national projections of costs may be disparate, potential crime savings to be realized from crime aversion/reduction strategies may vary accordingly.

The distinction must also be made between average, marginal (incremental) and aggregate costs (Cohen, 2000; Welsh & Farrington, 2000). According to Aos et al. (2001), average costs are calculated by dividing total costs by total workload in a specific time frame. Conversely, “marginal costs describe how the total cost of an operation changes as the unit of activity changes by a small amount” (p. 48). In this context, incremental costs vary with the number of participants in a program, for example, the costs of food, medical care for an increasing prison population (Cohen, 2000)²¹. To illustrate the difference between average and marginal costs, suppose that it costs \$2.1 million annually for 10 youth in custody, but \$2.365 million for 11 youth. In this example, the average cost per juvenile offender in custody is \$215,000²², but the marginal cost of the eleventh youth is \$265,000. Lastly, aggregate costs of crime are those that have widespread and significant impact on communities. In other words, these are collective costs to society that are generally not affected by the actions of any one criminal, for example, fear of crime and private security expenditures, (Cohen, 1998, 2000).

Issue 4: Is there a need to “discount” the costs of crime?

Related to this issue of cost measurement is the notion of “discounting²³,” that is, reducing the stream of future costs related to a given crime incident to their present value. One fundamental economic concept in computing the costs of crime (and all other societal costs) is the notion of the “present value” of money (Cohen, 2005; Cohen & Bowles, 2010). In the crime context, this concept is based on the fact that the costs of any given crime are not fully realized the instant the crime is committed, but unfold far into the future. In some cases, an inordinate period of time may pass before the criminal justice process (e.g., arrest, trial) is concluded, assuming that the perpetrator is even caught. There may be delays in services and compensation for victims, and they may experience reduced productivity for many years, need ongoing counselling and so on. Simply put, the crime incidents for which costs are currently being estimated in a given study have already happened, but their effects will continue to ripple throughout society for many years to come. Therefore, one must consider the future values of each of these costs in terms of their present value when estimating the total financial impacts of crimes committed within a specific time period.

Furthermore, a dollar is generally worth more in the present than in the future, given the potential for wage increases, investment and accumulation of compound interest. Also the inevitability of inflation means that the purchasing power of money erodes over time. For this reason, economists will apply a correction called a “discount factor”, adjusted for both rising wages and inflation, to convert all anticipated future costs to their present values. This reduces future costs by a certain percentage, typically in the range of two to three percent, in order to provide costs of crime estimates in terms of present value (Cohen, 2000).

3.0 Finding meaning in economic analysis: Issues and recommendations for translating theory into effective policy and programs

Thus far, this report has provided an overview of some of the basic concepts underlying both the costs of crime and economic analysis of crime prevention programs. It is hoped that at this point in the overview, the reader has gained a level of familiarity with cost-effectiveness and benefit-cost analysis. In choosing which type of analysis to utilize, decision-makers must weigh the advantages and disadvantages of each approach. For example, benefit-cost analysis is unit-independent, and therefore allows for comparisons among programs that do not have the same outcomes. It can also be used to contrast alternatives across

different areas of public expenditure (e.g., health, welfare, justice). However, it is also more resource-intensive, due to the time investment and methodological expertise required, and because some of the associated concepts (e.g., intangible costs) are somewhat nebulous. Cost-effectiveness analysis, on the other hand, is most useful when comparing programs that are trying to achieve the same objective (e.g., reductions in burglaries). Therefore, decision-makers need to ask themselves questions like: (a) How will the results be used? (b) What resources are available/accessible? and (c) How difficult are costs and benefits to value? (Kee, 1999). Despite the advantages that an economic analysis approach confers, there exist a number of drawbacks as well, particularly as it pertains to program implementation and impact evaluation methodology.

3.1 Limitations of program implementation and impact evaluation methodology

According to Welsh and Farrington (2000, p. 310), economic analysis is “an extension of an outcome evaluation, and is only as defensible as the outline on which it is based.” In other words, the process of implementing cost-effectiveness and/or benefit-cost analysis is only as strong as its weakest link, and will only be as robust as the impact evaluation used to measure the net effects of the program. In turn, the impact evaluation itself is only as sound as the thoroughness and conscientiousness of the initial program planning, design, and implementation. If one or more aspects of the policy/program are poorly delivered, or the evaluation is not rigorously conducted, these problems will carry over into the economic analysis as well. For example, if an impact study has absolutely no controls put into place (i.e., neither experimental, quasi-experimental, or statistical controls), then it is impossible to tell whether the program itself, or some other extraneous variable is responsible for any observed changes in the occurrence of criminal behaviour or other outcomes. Numerous studies (e.g. Ekblom & Pease, 1995; Sherman, Gottfredson, Mackenzie, Eck, Reuter, & Bushway, 1997; Welsh, 2007a) have shown that the lack of methodological rigor can lead to erroneous conclusions, and in cases where study quality standards are poor, monetary benefits cannot be attributable to the program, and may even be counterproductive or detrimental to decision-making processes (Cohen, 2000).

Some other known issues²⁴ associated with impact evaluation methodology include: displacement, diffusion, anticipatory benefits, and the number of years over which crime prevention programs are estimated (Farrell et al., 2004). Displacement²⁵ refers to the spatial, temporal or qualitative (target, tactical, offence, perpetrator) relocation/adjustment of crime in response to prevention initiatives (Eck, 1993; Gabor, 1981; Guerette, 2009). Conversely, diffusion refers to the beneficial effects of crime prevention efforts “spilling over” or emanating to areas/groups other than the intended targets (Clarke & Weisburd, 1994). Examining displacement and diffusion effects is important considering the influence that these occurrences may have on an impact evaluation. For example, when calculating the net effects of crime prevention programs (see sections 2.1.2 and 2.2.1), crime displacement may lead researchers to detect a larger (spurious) difference between intervention and control areas, thus making the results seem more promising than they actually are. The opposite is true for diffusion, where a more conservative or even non-existent difference may be observed, thus perhaps prompting the false conclusion that the crime prevention program in question is ineffective. A somewhat-related phenomenon is known as anticipatory benefits, which refers to crime reductions in intervention areas prior to the crime prevention program being implemented (Smith, Clarke & Pease, 2002)²⁶. This also affects program evaluations: failure to take anticipatory benefits into consideration when selecting the evaluation period could potentially lower the baseline crime rate, thus leading to an artificially inflated estimate of program effectiveness (Bowers & Johnson, 2003).

Additionally, given that the manifestation and stability of effects may not be as expected, the length of evaluation time periods and the use of subsequent follow-up studies should be carefully considered, in order to assess treatment/intervention effects²⁷. For example, if the follow-up period for assessing program impact is too short, it may not allow for adequate measurement of effectiveness if the treatment effects are delayed (i.e., the “sleeper effect”). The impact of many programs is not immediate, especially

those that aim to change attitudes, values, behaviours and opportunities in high-risk individuals (e.g., the Gang Resistance Education and Training (G.R.E.A.T.) program; Esbensen, Osgood, Taylor, Peterson, & Freng, 2001). However, most impact evaluations are short-term and/or arbitrary – follow-up periods (or the before and after periods in pre-post designs) typically last for no more than one or two years and are at the researcher's discretion. Truncated follow-up periods may lead to the inadequate capturing of treatment/intervention effects, which, in turn, will adversely affect the estimation of financial benefits. Consequently, the program may appear not to be cost-beneficial.

It may also be the case that the effect of a treatment/intervention appears neutral (or even promising) in the short-term, but either fades or reverses over time. The Cambridge-Somerville Youth Study²⁸, for example, saw no significant differences between treatment and control groups at the initial follow-up, both in terms of social adjustment and criminal justice involvement (as measured by court appearances and charges). However, more than a decade later (12 years), the individuals in the treatment group were more likely than those in the control group to experience alcoholism, develop mental illness, suffer from stress-related diseases, and die early. Furthermore, this effect was more pronounced for the youth who received treatment at a greater intensity (McCord, 1978, 2003).

Lastly, as Farrell et al. (2004) point out, many interventions will have a continued effect (e.g., Lochman, 1992; Reynolds et al., 2001) that will persist after the evaluation study is completed, so a condensed evaluation time frame may mean an underestimation of benefits. Some other treatment/intervention effects may be amplified over time, where the program will produce some initial short-term gains, but the greatest impact will only be observed years later. For example, a benefit-cost analysis of the High/Scope Perry Preschool Program²⁹ demonstrated that at age 27, there was a return of \$7.16 for every dollar in taxes invested (Barnett, 1996). At age 40 (35 years after the program's conclusion), the return had increased to \$12.90³⁰ per tax dollar invested (Belfield, Nores, Barnett, & Schweinhart, 2006). The Better Beginnings, Better Futures Program³¹ provides a similar example within the Canadian context. By grade 9, researchers observed a return of \$1.31 to the government for every dollar invested in the program. Three years later, by the time participants were in Grade 12, the return had almost doubled, to \$2.50 per dollar of investment (Peters, Bradshaw, Petrunka, Nelson, Herry, Craig, Arnold, Parker, Khan, Hoch, Pancer, Loomis, Bélanger, Evers, Maltais, Thompson, & Rossiter, 2010). Thus, in order to detect a useful impact and obtain data for conducting an economic analysis, long follow-up periods (often years) may be needed to allow a sufficient number of program-related events to accrue.

3.2 Recommendations

Based on this assessment of the limitations involved in an economic analysis study, decision-makers contemplating such an approach should consider the following research and policy recommendations:

Recommendation 1: Develop Canadian expertise in the field of economic analysis

At present, there are very few studies (e.g., LaBoucane-Benson, Hossack, Erickson, & Grunland, 2009; Peters, Nelson, Petrunka, Pancer, Loomis, Hasford, Janzen, Armstrong, & Van Andel, 2010) that have utilized economic analysis techniques to evaluate Canadian programs. The relative paucity of such research speaks to the need to build a solid foundation of economic analysis expertise on crime prevention in Canada. As an important first step in developing a national framework for measuring and monitoring the economic benefits of crime prevention in Canada, an international roundtable of experts in the areas of crime costing and economic analysis should be convened. This forum could be used to generate useful research questions, identify robust indicators of the economic performance of crime prevention programs, share methodological and subject matter advice, and even propose a series of demonstration pilot studies in specific jurisdictions. Underpinning the discussions that emerge from this roundtable should be a focus on developing a blueprint that will describe a comprehensive economic analysis framework for crime prevention projects and programs in Canada, while simultaneously addressing feasibility and sustainability issues.

As part of developing expertise in this area, there is also the need for Canadian researchers to broaden their knowledge of an evidence-based, “best practices” approach (Petrosino, Boruch, Soydan, Duggan, & Sanchez-Meca, 2001). Therefore, perhaps with the roundtable/forum as a launching point, a useful exercise would be to conduct an updated systematic review and/or meta-analysis of all economic analysis studies (domestic and international) of crime prevention programs, in order to consolidate techniques, findings, and limitations, and determine what might work best in the Canadian context. This study should attempt to cover both published and unpublished economic analysis studies of a wide variety of prevention strategies, such as situational crime prevention, crime prevention through social development, crime prevention through environmental design, and both problem-oriented and community policing (Schneider, 2010). An all-inclusive approach will help ensure solid results in terms of evolving trends in techniques, measures, costs, benefits, and methodological issues. The study should follow published guidelines for meta-analysis and systematic review, such as those put forward by the Campbell Collaboration (<http://www.campbellcollaboration.org>), as well as recent methodological commentaries (e.g., Berk, 2007; Lipsey, 2007; Pratt, 2010; Shadish, 2007). Although previous systematic reviews (e.g., McDougall, Cohen, Swaray, & Perry, 2008; Welsh & Farrington, 2000) and meta-analyses of economic analysis studies do exist (e.g., Drake, Aos & Miller, 2009), the proliferation of cost-effectiveness and cost-benefit analysis studies in the last decade speaks to the need for an updated assessment.

Recommendation 2: Create standards and standardized procedures for evaluation and methodological processes in economic analysis

As is evident from the discussion on limitations of benefit-cost analysis, the lack of uniformity in the measurement of costs (of both crime itself and prevention programs), impacts, and benefits, as well as inconsistencies in the application of analytical techniques, are significant impediments to integrating and comparing results across different economic analysis studies (e.g., Haapanen et al., 2009). Crucial to a nationwide, Canadian program of economic appraisal in crime prevention is the development of a common data collection and analytical framework on the assessment of costs (both of crime itself and prevention projects), outcomes, and benefits related to a wide variety of programs. In order to reduce inter-study variability and maximize comparability among economic analysis studies, Tonry and Farrington (1995) prescribe that a standardized how-to manual³² be developed and followed, such that costs and benefits are chronicled in a comprehensive, systematic and methodologically rigorous manner. As well, standardized tables of per-unit cost³³ for the different types of crime should be included in this how-to manual, as this will facilitate the computation of potential averted costs, thus making the addition of a cost-benefit analysis a much less daunting exercise (Farrington, D.P., personal communication, August 10, 2011; McCollister et al., 2010).

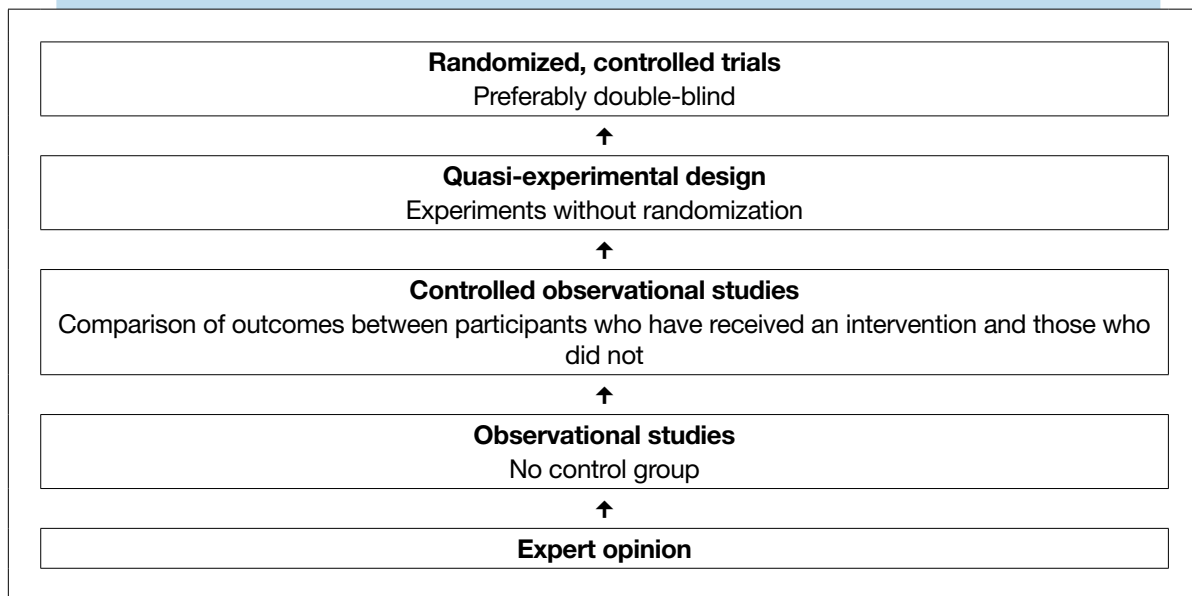
Given that the question of which societal costs/benefits to include is a recurring one, another option is to institute a standard operating procedure in all economic analyses that requires a sensitivity analysis to test how robust and reliable the results are. The purpose of a sensitivity analysis is to account for uncertainty and variation in study criteria, and conducting one means having to identify study variables that potentially impact program outcomes, repeat the economic analysis with different inputs, then assess the outcomes to determine which variables the study is sensitive to (Leung, 2004)³⁴. Along this line of thought, Farrell et al. (2004) propose that in an extension of sensitivity analysis, a limited portfolio of benefit-cost ratio outcome measures informed by stakeholder objectives should be created. This exercise can be customized such that the audience for the economic analysis can identify the most relevant outcome measure or range of estimates for their decision-making needs. Allowing multiple perspectives will illustrate variations in the benefit-cost ratio, depending on the inclusion/exclusion of intangible costs of crime, use of local or national cost estimates, the inclusion or exclusion of displacement, diffusion and anticipatory benefits, and for different anticipated rates of return over time and different discount rates³⁵.

Moreover, given that the credibility and usefulness of an economic analysis study is dependent on the quality of the research design, this how-to manual should also recommend how best to ensure the scientific veracity of methods that are used throughout all phases of the study. There are a number of

well-regarded criminal justice papers that provide guidelines as to what the highest methodological quality standards are, and how to ensure that these standards are being met. Paramount among these are the four criteria put forth by Cook and Campbell (1979) and Shadish, Cook and Campbell (2002): statistical conclusion validity, internal validity, construct validity, external validity³⁶. Farrington (2003) has also advocated for the addition of a descriptive validity measure to determine the methodological quality of evaluation research.

In the area of crime prevention, a similar scheme of study standards is the Maryland Scientific Methods Scale (SMS), which assesses methodological quality based on sample size, presence/types of comparison groups, use of control variables to account for initial group differences, appropriateness of variable selection/measurement, attrition, length of follow-up and the use of statistical tests (Sherman et al., 1997). Subsequently, Farrington, Gottfredson, Sherman and Welsh (2002), after identifying fallacies with the scale system, downgrading procedure and method of drawing conclusions, have suggested improvements to the SMS by using 20-point subscales (potentially with different weights) that address issues of statistical conclusion validity, internal validity, construct validity, external validity and the quality/completeness of study reporting. With this in mind, a general hierarchy of experimental designs is shown in Figure 2.

FIGURE 2. A HIERARCHY OF IMPACT EVALUATIONS – RANDOMIZED, CONTROLLED, DOUBLE-BLIND TRIALS ARE CONSIDERED THE “GOLD STANDARD”



*Note: Farrington, 2003; Levin & McEwan, 2001.

Although a number of researchers (e.g., Cook & Campbell, 1979; Farrington, 2003; Sherman et al., 1997) have deemed the minimally acceptable standard to be a pre- post-test design with appropriate intervention and control groups, others (e.g., Weimer and Friedman, 1979, p. 264) argue that benefit-cost analysis “should be limited to programs that have been evaluated with an experimental or strong quasi-experimental design.”

The last point related to the issue of methodology is that the results of an economic analysis cannot always be generalized. One cannot necessarily expect economic benefits observed in a single implementation of a specific program to be perfectly reproduced in other settings, populations, cultures, or even time periods (Levin & McEwan, 2001). For example, a given cost-effectiveness or cost-benefit

ratio obtained from a social development intervention with non-Aboriginal youth in a large Canadian urban centre (e.g., Toronto) may not be replicated if the program is administered to non-Aboriginal youth in another major Canadian city (e.g., Montreal), let alone to Aboriginal youth in remote Northern communities. Therefore, when using the results of economic analysis for informing decisions about which crime prevention programs are worthy of “propagation,” there should be a reasonable match between the conditions which produced the original economic benefits and those that will be present in all potential future implementations³⁷.

Recommendation 3: Develop a network of economic analysis stakeholders

In order to move Canadian crime prevention research and evaluation toward incorporating economic analysis on a larger scale, a structured, coherent multi-agency and multi-disciplinary approach is needed. Any major research and policy initiative requires the design of a coherent strategy, the establishment of consultation mechanisms among the key stakeholders, the promotion of closer partnerships and information exchanges and the undertaking of joint projects. Given the interdependence of various areas and levels of government, continuous and integrated collaboration is necessary in order to advance this economic analysis agenda. For example, analysts in government agencies who oversee program funding and compliance with reporting requirements must cooperate with criminologists and crime prevention practitioners who design and implement programs and assess impact. Economists, who are required to help select useful monetary indicators of program success, and ensure that econometric principles and assumptions are rigorously applied, need to work in conjunction with quantitative methodologists, who are skilled at applying various sophisticated procedures for assessing costs and benefits. Lastly, policy-makers must interface with all of the afore-mentioned subgroups to use the results of economic analysis to decide which programs to fund, expand, replicate, or discontinue. Thus, it is crucial to establish a network of representatives to foster meaningful and ongoing dialogue on economic analysis.

Recommendation 4: Standardize reporting procedures for economic analysis

Considering that the Canadian government has budgeted approximately \$112 million over the next three fiscal years for the National Crime Prevention Strategy (Public Safety Canada, 2011), it is important that there be a repertoire of evidence to determine which program alternative(s) provides the greatest return on its investment above and beyond its effectiveness at reducing/preventing crime. As discussed in the introduction, the goal of economic analysis is to provide a systematic way of comparing the outcomes, potential benefits and cost-efficiency of a host of policies/programs to assess which to implement, maintain or terminate. To set the stage for this comparative process, a policy scorecard analysis template may be used to summarize the results of the analysis while simultaneously highlighting major alternatives and key trade-offs (see Table 5). Listed along the side are potential impact categories (cost, outcome and benefits) of the program, as well as any overarching program design features. The subsequent columns detail the main program/policy options, with each cell specifying how those impacts will be measured and the results of the measurements (Karoly et al., 2001).

TABLE 5. A STYLIZED EXAMPLE OF A BENEFIT-COST ANALYSIS SCORECARD

Impacts	Alternative policies/programs			
	Baseline: No program	Program A	Program B	Etc.
Program descriptors				
Cost elements Staff salaries Facility rental Etc.				
Outcomes ³⁸ Criminal offending Recidivism Violent behaviour Antisocial attitudes Etc.				
Cost-Effectiveness Ratio				
Benefit-Cost Ratio				

*Note: adapted from Karoly et al., 2001.



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Notes

1. The total estimate is derived from a combination of: criminal justice system costs (e.g., police, courts, corrections), victim costs (e.g., medical attention, productivity losses, stolen/damaged property), third-party costs (e.g., shelters, services, compensation), as well as estimates of pain/suffering and loss of life.
2. For a similar, but more recent cost-benefit analysis of delinquency prevention programs, please refer to the Pennsylvania study conducted by Jones, Bumbarger, Greenberg, Greenwood and Kyler (2008).
3. Following Welsh and Farrington (2000), cost analysis, which monetizes only program inputs, will not be considered as a major economic analysis approach as it does not attempt to relate a program's costs with its outcomes. Instead, it will be described as a component technique to measure part of the information required within the context of cost-effectiveness and benefit-cost analyses.
4. One caution to note here is that programs with different goals will invariably have different performance/ outcome indicators, so in order to maximize comparability among cost-effectiveness ratios, only alternatives with similar objectives should be used in a cost-effectiveness analysis (Levin & McEwan, 2001).
5. The mathematical formula for a benefit-cost ratio is:

$$\frac{\sum_{t=0}^T \frac{B_t}{(1+r)^t}}{\sum_{t=0}^T \frac{C_t}{(1+r)^t}}$$

where B_t = benefits of the project at time t , C_t = costs of the project at time t , r = rate of discount and T = lifetime of the project (van Soomeren, Wever, Pascoe, Monahan & Oxley, 2005). However, in the interest of presenting a readable account, a simplified text version will be used.

6. A cost-benefit ratio (CBR) is simply the inverse of a benefit-cost ratio (BCR), so $CBR = 1/BCR$.
7. An alternate way of analyzing cost and benefit information is by looking at net value (benefits minus costs). However, as Welsh and Farrington (2000) point out, the BCR has several advantages in that it controls for currency and time period differences.
8. If an evaluator wants to restrict their analysis to the costs and benefits realized by a program's funding body, cost-savings analysis (a subset of benefit-cost analysis) may be used. In this case, *only* the costs and benefits to the particular stakeholder (e.g., a government agency) are considered (Australian Institute of Criminology, 2003). For an example of such a study, please refer to the Conference Board of Canada (2009).
9. It is somewhat preferable to monetize the lifetime cost of an offender using both official records *and* repeated self-reports (e.g., Farrington, Coid, Harnett, Jolliffe, Soteriou, Turner, & West, 2006). By comparing the difference between the two measures, one can obtain an estimate of the "offense multiple" to account for the fact that only a small proportion of offences results in police detection and follow-up (Cohen & Piquero, 2009).
10. The estimated cost of one residential burglary in Canada is based on similar data from other countries, for example, NZD\$7,060 in 2003-04 for New Zealand (Roper & Thompson, 2006), AUS\$2,700 in 2005 for Australia (Rollings, 2008), and £3,648 in 2007-08 for the U.K. (Sinclair & Taylor, 2008). The figure used here is based on the USD\$6,482 calculation by McCollister et al. (2010).
11. In Canada, the equivalent *Criminal Code* charge is breaking and entering (Kowalski, 2000).
12. Brennan & Dauvergne (2011).
13. This is likely an underestimation of the true cost of burglaries, as it does not consider unreported incidents (Bowles & Pradiptyo, 2004).
14. To account for the potential difference between the official police-reported crime rate and the actual volume of crimes being committed, the number of unreported crimes can be estimated via self-reported victimization surveys, for example, the General Social Survey in Canada (Perreault & Brennan, 2010).
15. In this study, crime included burglary, serious assault, armed robbery, rape/sexual assault and murder.
16. By the same logic, given that a cost-benefit ratio (CBR) is the inverse of a benefit-cost ratio (BCR), CBRs should be less than 1.0 and as low as possible.
17. Although there are scholars who claim that it is "morally and intellectually deficient" to financially quantify the value of a human life (Baram, 1979, as cited in Graham & Vaupel, 1981), there are others who argue that this is a rational and necessary undertaking for public policy analysis (e.g., Ackerman & Heinzerling, 2001; Bayles, 1978). Suffice to say, this debate will not be resolved here, but it is worthwhile to clarify that when referring to the "value of life", many economists use that term to mean the value of a "statistical life," which, in essence, represents lost productivity costs and/or willingness-to-pay to reduce the risk of one fatality (Andersson & Treich, 2009).
18. For a discussion on the variation in the valuation of a statistical life, please refer to Brannon (2004), Graham and Vaupel (1981), Leung (2004) and Viscusi and Aldy (2003). See also Mrozek and Taylor (2001) for a meta-analysis.

19. Examples of recent progress in estimating the intangible costs of crime can be found in the following works: Dolan, Loomes, Peasgood and Tsuchiya (2005), Dolan and Peasgood (2007) and Moore and Shepard (2006).
20. Not including mental health service costs, productivity losses, or lost income.
21. In contrast, fixed costs are generally invariable. For example, the cost to maintain a criminal court generally remains static regardless of how many cases are tried in a year. See Cohen (2000) for a more comprehensive account of fixed versus marginal costs.
22. This is the 2009 cost in British Columbia, as reported by the Representative for Children and Youth and the Office of the Provincial Health Officer.
23. More extensive discussions of discounting and the various statistical procedures, choices, assumptions, and data source integration involved in estimating the costs of crime is available in several detailed technical works (e.g., Cohen, 2005; Cohen & Bowles, 2010; Cohen & Piquero, 2009; Cohen, Piquero, & Jennings, 2010; McCollister et al., 2010; Moolenaar, 2009; de Urbina & Ogus, 2009).
24. As Roman (2004) rightly points out, methodological issues (e.g., attrition, small sample size, selection bias) associated with impact evaluations in benefit-cost analysis are largely the same as those of research/evaluation studies in general (see also Levin & McEwan, 2001). The issues highlighted here merely reflect a selection.
25. Spatial displacement is when offenders alter the location(s) in which they commit crime. If offenders change the time at which they commit crime, it is known as temporal displacement. Target displacement refers to when offenders switch targets, whereas tactical displacement is when offenders adjust the methods used to commit crime. When offenders switch to committing different types of crimes, it is known as offence displacement, but if new offenders replace old offenders, then it is perpetrator displacement. For a more in-depth discussion of crime displacement definitions and issues, please refer to Gabor (1981) and Guerette (2009).
26. There are a number of explanations why anticipatory benefits are observed, with the most popular one being that the publicity that occurs in anticipation of the crime prevention initiative has a deterrent effect on criminal activity (Bowers & Johnson, 2003; Farrell et al., 2004).
27. See Farrington (2006) for a discussion on the advantages of longitudinal-experimental studies in criminology and a selection of examples.
28. The Cambridge-Somerville Youth Study paired rebellious youth with extrafamilial mentors who would provide consistent friendship, encouragement and guidance in an attempt to divert them away from a life of crime. The treatment took place over an average of five and a half years, with the counsellors establishing relationships with the teens and families, and supporting them in a variety of ways (e.g., parental counselling, tutoring, specialist referrals).
29. The High/Scope Perry Preschool Program was implemented in the Ypsilanti (Michigan) school district from 1962 to 1965 (Hohmann & Weikart, 2002). The target population was African American children aged 3-4, who were socioeconomically disadvantaged and had relatively low IQ scores. The goal of the program was to promote cognitive and social development in these at-risk children by using a more autonomous learning approach and promoting greater parent-teacher involvement. For more information, please refer to <http://www.highscope.org>.
30. The dollar amounts are expressed in 2000 dollars with a discount rate of 3%. In order to be comparable to the figures reported at the age-27 follow-up, the calculation of age-40 benefits only takes into account the general public perspective and not the participants' (Schweinhart, Montie, Xiang, Barnett, Belfield, & Nores, 2005). However, the total return on investment (for both the public **and** the participants) at age 40 is \$16.14 per dollar invested (the initially reported \$17.07 figure was erroneous).
31. The Better Beginnings, Better Futures model, adopted by the Ontario Ministry of Community and Social Services in 1991, targets young children in economically disadvantaged, high risk neighbourhoods in an attempt to prevent poor developmental outcomes. For more information, please refer to <http://bbbf.queensu.ca>
32. See Dhiri and Brand (1999) for a U.K. example, Aos et al. (2001) and Aos and Drake (2010) for a U.S. (Washington State) example, and the JJEC (2002) for a juvenile justice example.
33. For example: Dubourg et al. (2005), Heaton (2010), McCollister et al. (2010), Rollings (2008), Roper and Thompson (2006) and Sinclair and Taylor (2008).
34. See Levin and McEwan (2001) for a detailed description on how to conduct a sensitivity analysis.
35. As an example, refer to Farrell et al. (2004) for a detailed benefit-cost analysis of the Reducing Burglary Initiative using a limited portfolio approach.
36. It is beyond the scope of this particular report to explicitly detail the definitions of the variables that Cook and Campbell (1979), Farrington (2003), Shadish et al. (2002) and Sherman et al. (1997) consider important in assessing methodological quality. Readers who wish to obtain a more comprehensive perspective should refer to these parent articles.
37. Studying moderators of treatment/intervention effects (via a meta-analysis) will assist in mitigating this issue, as this can help program designers better account for cross-environmental variations when transposing projects from one setting to another (Lipsey, 2009).
38. Given that cost-savings/benefits are generally crime-specific (see Section 2.2.2), it may be useful to record the types of crime used to analyze outcome measures.
39. An errata was issued at http://www.highscope.org/file/Research/PerryProject/Errata_3Final.pdf.