



**Attorney General
& Justice**

LITERATURE REVIEW: COST OF CRIME

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INTRODUCTION

Estimates of the cost of crime are an integral part of an evidence-based crime prevention framework. Researchers have been considering the idea of costing crime since 1964 (Martin & Bradley, 1964), but estimates have not been available until the last 20 years. Because of the small size of this literature, there is large variance in estimates between countries and between individual studies. This report aims to survey the cost of crime literature, highlight similarities and differences between studies, and suggest ways forward for conducting cost analysis on crime prevention programs in NSW.

SUMMARY OF FINDINGS

The cost of crime literature is relatively small and new. There is a small collection of studies attempting to generate estimates for a wide variety of common crimes. However, in Australia, New Zealand, and the United Kingdom, there are only single studies (some with subsequent small revisions), and these have not been independently verified. An international comparison of estimates shows that – assuming Australia is somewhat comparable to countries such as New Zealand, the United Kingdom and United States – Australian estimates are likely to be underestimates. This is particularly likely to be true in the case of violent crimes.

The United States has by far the highest cost of crime estimates. However, it also has the widest access to data, the most independent verification of individual studies, and the most use of more recently developed, possibly more sophisticated techniques. It is difficult to say whether the higher cost of crime estimates are due to these factors or due to unique US characteristics that do not translate to Australia.

APPLICATIONS OF COST OF CRIME ESTIMATES

Estimates of the cost of crime are important because they form the basis of quantifying benefits of crime prevention programs in cost-benefit analyses. They allow evaluators to combine information on the outcomes of a program with information on the costs of a program to conclude whether the program generated net benefits to society, and whether it should be expanded (Cohen, 2000). They also allow several potential policy solutions to be compared on a consistent basis, and ranked by the amount of benefits generated for each dollar of program costs (see, for example, Aos, Phipps, Baarnoski & Lieb, 2001; Fowles, Byrnes & Hickert, 2005).

To illustrate, consider a program that costs \$50,000 and prevents 20 assaults and 40 thefts. If the relevant cost of an assault is \$1,000 and the cost of a theft is \$500, then the overall benefits generated (costs avoided) by the program are $\$1,000 \times 20 + \$500 \times 40 = \$40,000$. Since benefits are less than the costs of the program, the program should probably not be continued. However, if the cost of an assault was \$2,000 and the cost of a theft is \$750, then the benefits of the program would be $\$2,000 \times 20 + \$750 \times 40 = \$70,000$, well above the costs. In this case, the program can be considered a success from society's point of view.

There are alternative evaluation methods that do not require benefits to be monetised. These generally express the costs as a function of the outcome of the program (for example, cost per crime prevented). However, it is probably reasonable to assume that different types of crimes impose different costs on society. An assault is likely to be more costly than a theft, for example. Therefore even if outcomes do not need to be monetised, the evaluator needs a measure of the relative seriousness of various crimes. Cost of crime estimates can provide this.

Finally, cost of crime estimates can be used to identify areas for future crime prevention research and action. If it is discovered that the cost of criminal damage in NSW is particularly high, then it is likely that efforts to reduce the incidence of criminal damage will generate sizeable benefits in the community and this is where crime prevention efforts would be most usefully focused.

HISTORY OF MAJOR STUDIES

The cost of crime literature appears to generally be confined to four countries: Australia, New Zealand, the United Kingdom and United States (Centre for Criminal Justice, 2008). In each of these countries, major studies have been undertaken attempting to comprehensively estimate the cost of various common crime categories. Subsequent work done in these countries on either cost of crime or crime prevention evaluation has generally relied on these studies.

In addition to these comprehensive studies, there have been several other studies attempting to independently estimate more specific types of costs. Examples include the costs of violence (Corso, Mercy, Simon, Finkelstein & Miller, 2007) or sexual violence (Miller, Taylor & Sheppard, 2007), the cost of alcohol-related crime (Miller, Levy, Cohen & Cox, 2006; Miller, Levy, Spicer & Taylor, 2006), the cost of fear of crime (Dolan & Peasgood, 2007), the cost of crime in specific states (Aos et al., 2001), and the cost of mental health care (Cohen & Miller, 1998).

Australia

The only study to attempt to generate estimates of the cost of multiple crimes was Pat Mayhew of the Australian Institute of Criminology in 2003. Kiah Rollings subsequently updated this study in 2008, using an identical methodology. All subsequent cost-benefit analyses of crime prevention programs in Australia have relied on figures from this study. Estimates were based on a combination of ABS crime surveys, a study of the cost of Australian deaths and injuries from 1995, and British Crime Survey information from the UK.

United Kingdom

Studies have been attempted by the Home Office in 2000 (Brand & Price, 2000), and updated soon after (Dubourg & Hamed, 2005). The Home Office anticipates on updating these estimates semi-regularly in the future (Centre for Criminal Justice, 2008). The 2000 study attempted to break costs down into costs in anticipation of crime (money spent on insurance and security), costs as a consequence of crime (victim costs), and costs in response to crime (costs of the criminal justice system). This framework has been followed by the subsequent studies in Australia and New Zealand (Mayhew, 2003; Roper & Thompson, 2006), although those studies differed in the specific methodology for estimating each component.

New Zealand

The cost of crime has been examined only once, by the New Zealand Treasury in 2006 (Roper & Thompson, 2006). This paper attempted to estimate the average public and private sector cost per crime. However, there were two major limitations of this study. The first was that information on New Zealand private sector costs (i.e. costs to victims) were largely unavailable, and so the authors used estimates from the UK Home Office's 2005 study. Since victim costs accounted for about 77% of the total cost estimates, this meant that the study was heavily reliant on the previous UK estimate. The second limitation was that the many crimes were grouped together in categories such as "violent offences", making comparisons to other studies somewhat difficult.

United States

Methods to accurately capture the value of intangible quality of life costs first became available in the US in 1988, when Mark Cohen examined a large dataset of jury awards from cases where victims sued perpetrators of non-fatal crimes.

A study commissioned in 1996 by the US Department of Justice expanded the scope to look at criminal justice system costs, medical costs, productivity losses, and property losses, in addition to the quality of

life estimates (Miller, Cohen & Wiersema, 1996). These estimates became the benchmark in cost of crime estimates in the US, and are currently still used by many studies.

In 2004, a study used a new 'willingness to pay' methodology (discussed below) to generate alternative cost of crime estimates (Cohen, Rust, Steen & Tidd, 2004). These estimates have been used by several subsequent studies (for example, DeLisi, Kosloski, Sween, Hachmeister, Moore & Drury, 2010).

EMPIRICAL COMPARISON

To see how existing Australian estimates compare to international studies, estimates were gathered from all studies focused on Australia, New Zealand, the United Kingdom and the United States that contained at least one estimate of the cost per type of crime.

Estimates were inflated to present values by using the implicit price deflators of the final demand of gross domestic product of the country that the study was conducted on. This increases prices according to the price levels of all goods and services in the economy (including labour), rather than simply consumer goods, thereby giving a more accurate result than CPI measures. International estimates were then translated into Australian dollars based on purchasing power parity figures used by the World Bank. This takes greater account of the difference in prices between countries than a conversion based on market interest rates would. All values referred to in this report are 2010 Australian dollars.

Studies sometimes provided more than one cost estimate for a crime type. This could have been a result of a plausible alternative methodology, or a more specific estimate where a crime could be broken down to subcategories with different characteristics. For example, a study might report the average cost per assault, and then also the cost per common assault, aggravated assault and grievous bodily harm. In this case all four estimates were included. For this reason, the number of cost estimates in any particular crime category are generally greater than the number of studies examined.

Graphs showing the average cost estimate per country and each of the individual estimates for eight types of crime are attached as appendices. In addition, a comparison of the estimates from the eight comprehensive studies is shown in Table 1.

Table 1: Comparison of Comprehensive Study Estimates

Study	Country	Murder	Sexual Assault	Assault	Robbery	Burglary	MV theft	Other theft	Property Damage
Mayhew (2003)	Aus	2,058,525	3,216	2,316	4,632	3,088	7,719	549	901
Rollings (2008)	Aus	2,239,077	8,769	1,982	2,654	3,391	8,161	768	1,462
Roper & Thompson (2006)	NZ	–	83,593	–	26,771	8,182	–	1,507	2,503
Brand & Price (2000)	UK	3,216,937	55,565	12,593	13,745	6,726	2,603	994	1,491
Dubourg & Hamed (2005)	UK	3,919,677	84,461	11,991	19,564	8,780	11,117	1,703	2,327
Cohen (1988)	US	–	132,678	14,714	23,609	3,459	8,452	498	–
Miller, Cohen & Wiersema (1996)	US	6,402,167	188,597	20,377	17,342	3,035	8,021	802	–
Cohen et al. (2004)	US	18,555,232	453,360	133,904	443,795	47,823	–	–	–

All costs in 2010 Australian dollars.

The most obvious observation that can be made is that there is a very large variation between different estimates of the same type of crime. This is to be expected, as the cost of crime contains a number of components that are all inherently difficult to measure, and the literature as a whole is relatively new (see the following section for a discussion of possible reasons for variations). However, some general observations about the estimates can still be made:

- Crimes against the person (homicide, sexual assault, assault, and robbery) generally involve much higher costs than property crimes. This is likely to be because of a combination of factors, including property crimes being harder to prosecute, and so incurring smaller criminal justice expenses; health costs being more costly than the cost of replacement of property; and violent crimes generally being far more traumatic than property crimes.
- The largest aspect of the costs of crimes are intangible ‘quality of life’ costs, as opposed to tangible or monetised costs such as medical expenses, or the loss of income due to injury. This is particularly true in the case of violent crimes such as assault or sexual assault, where in some cases there may not be any tangible costs. For example, intangible costs make up two thirds of all costs of assault (Dubourg & Hamed, 2005). Since intangible costs are particularly hard to value, the significance of intangible costs can in large part explain why estimates between studies can vary so much. In addition, the presence of large intangible costs indicates that any cost analysis based solely on the monetised costs of crime will severely underestimate the cost to society, and may come to invalid conclusions (Mayhew, 2003).
- Despite variances between individual studies, the average costs of property crimes per country appear to be relatively comparable. In most categories of property crime, Australian averages are similar to either UK or US estimates, or both. One reason for this could be that a smaller proportion of property crimes are intangible costs, and that the tangible costs (i.e. values of property lost) are particularly easy to value, due to insurance requirements. This means that there is less scope for methodological differences of studies affecting the results. Because of this, it is probably the case that AIC estimates of the cost of property crime are relatively accurate, and can be used for valid analysis.

- There seem to be very large differences between Australia and other countries in cost estimates of violent crime. Non-Australian estimates are about 10 times greater than Australian estimates of assault, and 20 times greater than Australian estimates of sexual assault. There is also a large variation between countries such as the UK and New Zealand and countries such as the US in these categories, but it seems clear that Australian estimates are severely underestimated. The cost of a sexual assault of \$3,216 found by Mayhew in 2003 does not seem to pass the test of common sense. Although this estimate was more than doubled in the subsequent AIC update, the estimate is still similar in magnitude to the estimate of a cost of a motor vehicle theft, a crime that most consider to be far less serious.

Two crime types were investigated in more detail. In this more detailed analysis, only original studies were used (as opposed to studies that used previously published estimates), a single estimate was used from each study, and criminal justice system costs were excluded. Assault was chosen because of the large difference between Australian and international estimates and the fact that this is NSW's most prevalent serious crime type (Goh & Moffat, 2010). Homicide was chosen because it has the same definition in every jurisdiction, many studies use it as a starting point and then estimate other crimes with reference to the homicide figure, and because the estimate represents the value of a life, estimates of the value of a statistical life (VSL) from other fields (such as health or road safety) can be used for comparison (Miller, 2000).

Assault

In NSW, assault is separated into common assault (generally minor injuries), aggravated assault (more severe injuries), and grievous bodily harm (very serious injuries). Apart from differences in terminology, these categories are generally consistent across countries. However, the US studies do not separate aggravated assault from grievous bodily harm. For this reason, estimates of common assault, aggravated assault and grievous bodily harm, and all assault were individually compared. A list of assault estimates is shown in Table 2 and country averages are summarised in Figure 1.

There is a general increasing trend over time in the US and UK cost of assault estimates. However, this is not true of the Australian estimates. The estimate of common assault was relatively unchanged between 2003 and 2008, and the aggravated assault and all assault estimates both declined. This is despite the fact that even the 2003 Australian estimates were far less than estimates from other countries. Across all assault categories, the Australian estimates are the lowest, with the UK estimates between four and five times higher, and the US estimates consistently the highest. The US averages are high partially because of the very high willingness to pay estimate in that country.

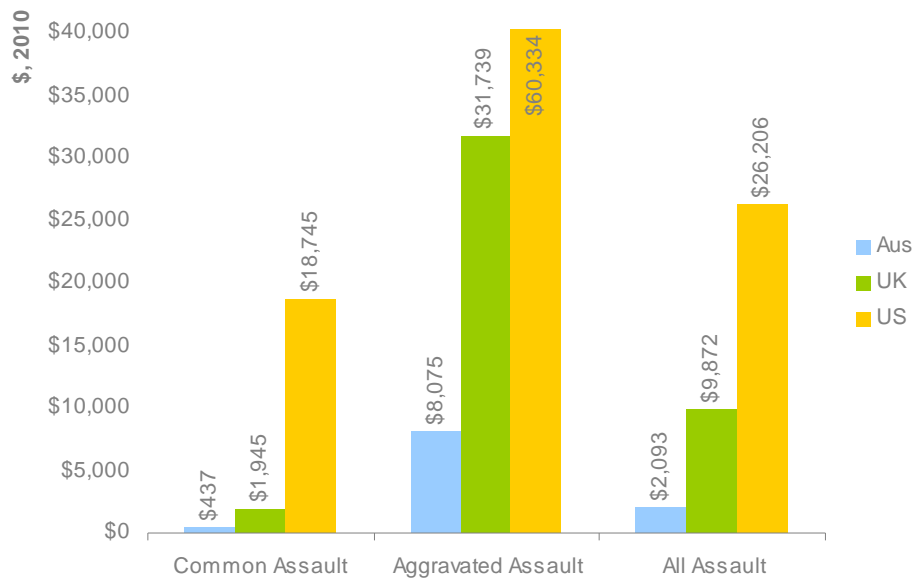
This analysis shows that Australian estimates of the cost of assault are far lower than international studies across all categories of assault. Furthermore, both the tangible and intangible costs are far lower in Australia than internationally. This indicates that the difference in estimates cannot be solely explained by factors such as differences in the way assault is defined, or difference in medical costs. Given the international evidence, it appears that the Australian cost of crime estimates are misspecified.

Table 2: Estimates of the Cost of Assault

Assault Type	Country	Year	Estimate
Common Assault	Aus	2003	425
		2008	450
		Average	437
	UK	2000	778
		2005	3,112
		Average	1,945
	US	1996	7,179
		2004	30,311
		Average	18,745
	Average		
Aggravated Assault & GBH	Aus	2003	9,135
		2008	7,015
		Average	8,075
	UK	2000	44,470
		2005	19,008
		Average	31,739
	US	1996	59,026
		2004	135,600
		2010	80,772
		Average	60,334
Average			50,718
All Assault	Aus	2003	2,187
		2008	1,999
		Average	2,093
	UK	2000	10,203
		2005	9,541
		Average	9,872
	US	1988	14,714
		1993	25,489
		1996	20,275
		2006	20,859
		2006	51,261
		2007	13,146
		Average	26,206
Average			18,741

All costs in 2010 Australian dollars.

Figure 1: Country Averages of Assault Costs



Homicide

A comparison of the average value of statistical life estimates and the cost of crime estimates from a selection of countries is shown in Table 3 and Figure 2. Criminal justice costs have been excluded from homicide estimates to allow for greater comparison.

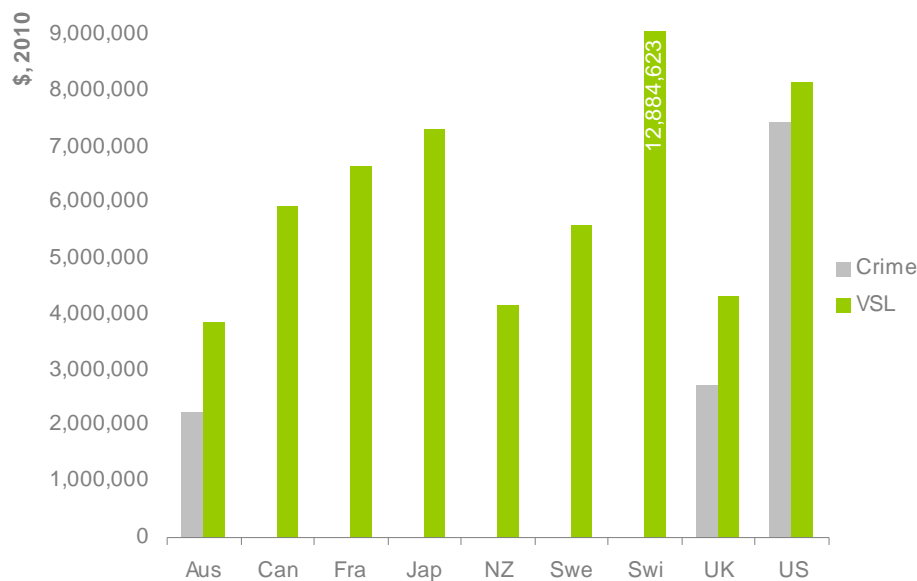
The VSL estimates are relatively consistent across countries, with the average of most countries being between \$4-7 million. However, the specific estimates for homicide are lower than this, and every country with a cost of homicide estimate has a far larger value of statistical life. This does not appear to make sense. Values of statistical life are generally derived from the public's willingness to pay to avoid relatively 'impersonal' causes of death, such as vehicle accidents, workplace hazards, or diseases. While these are not desirable causes of death, most people are likely to view homicide as being as desirable, if not less so (because it may be a more traumatic experience for the person's loved ones, for example).

Table 3: Comparison of Estimates of Homicide Cost and VSL

Country	Homicide	VSL	Average	No of Estimates
Australia	2,253,577	4,939,398	3,865,070	10
Canada	–	5,945,357	5,945,357	3
France	–	6,644,710	6,644,710	2
Japan	–	7,325,365	7,325,365	2
New Zealand	–	4,152,550	4,152,550	2
Sweden	–	5,580,037	5,580,037	3
Switzerland	–	12,884,623	12,884,623	3
UK	2,740,953	6,452,106	4,331,448	7
US	7,441,400	9,013,290	8,166,887	13

All costs in 2010 Australian dollars.

Figure 2: Comparison of Estimates of Homicide Cost and VSL



That is, people are likely to be willing to spend as much, if not more, on avoiding being a victim of homicide as avoiding being a victim of a road fatality. This is not consistent with the finding that the cost of homicide is 20-60% lower than the value of a statistical life. Given that measures of VSL have been analysed and accepted in varied fields much deeper than the cost of crime literature (Abelson, 2008), it is likely that the cost of crime estimates are underestimated, as opposed to VSL estimates being overestimated.

REASONS FOR VARIATION

As noted above, the estimates of the cost of crime vary widely between studies. There are a several reasons why studies might differ so much. Since there have been relatively few comprehensive studies on the cost of crime, it is not possible to precisely estimate the size of each of these effects, but they are discussed in descending order of their likely importance.

Country Examined

One of the defining characteristics of the studies is that estimates tend to be computed with similar methodologies within countries, but different methodologies across countries. It tends to be the case that one study sets the framework, and then subsequent studies in that country refine the numbers but leave the framework identical (for example, Rollings, 2008; Dubourg & Hamed, 2005). Even where researchers attempt to keep methodologies consistent (for example with the Australian and New Zealand estimates, that tried to replicate the UK methods), the approach is usually different in some aspects because of differences in the availability of data.

The country that the study is based in is also likely to have an effect on the results beyond methodological differences. It is likely that the cost of property crime is highly related to both the average income of a country, as well as the degree of inequality present in a country. In addition, the cost of medical care is likely to affect the cost of violent crimes, and the cost of labour will impact aspects such as the lost productivity of victims taking time off work. Finally, attitudes across societies could affect affect issues such as the willingness of victims to obtain and pay for mental health treatment, or the cost of the fear of crime.

Willingness to Pay vs After the Fact Estimates

Almost all of the cost of crime literature has in the past been based on 'after the fact' estimates, where the analyst examines crimes that have occurred, and attempts to tally all of the tangible and intangible costs that have been incurred as a result of those crimes. However, a recent trend in cost of crime estimates has been towards a 'willingness to pay' methodology.

This involves asking the public what they would be willing to pay to reduce the likelihood of them becoming a victim of a specific crime, and then combining this with information about the risk of victimisation to calculate the implied cost of one crime from the results. For example, Cohen et al. (2004) find that people are on average willing to pay \$200 annually for a 10% reduction in break and enter in their community, which translates into an implied willingness to pay to prevent one instance of break and enter of \$47,823. (The technical details of the calculation are complicated, but are set out in Haab & McConnell, 1997). Willingness to pay can also be inferred from consumer behaviour, for example by analysing house prices, or the demand for goods relating to security or safety (Abelson, 2008).

While willingness to pay methods are relatively new in the cost of crime literature, the techniques are well-established in other areas that require the valuation of abstract concepts, such as environmental, health, or road safety economics (Hensher, Rose, Ortuzar & Rizzi, 2009). As the people that are surveyed are both taxpayers and potential victims, most research assumes that willingness to pay measures comprehensively estimate all of the costs related to crime (see Figure 3 below).

One major characteristic of willingness to pay is that it tends to be significantly higher than ex post methods. One reason for this is that willingness to pay measures are generally more comprehensive. In ex post estimates, the analyst must specify each component of the cost of crime (for example medical costs, criminal justice system costs, property loss, and quality of life costs) and some of these costs are difficult to capture accurately or attribute them to specific crimes (for example fear of crime, reduced quality of life for non-victims, or reduction in investment in high-crime areas). In comparison, willingness to pay estimates are generally considered to be inclusive of all costs relating to crimes (Cohen et al., 2004).

Figure 3: Relationship Between Willingness to Pay and Other Estimates



Tangible costs are costs for which there is a market price. This includes victim costs such as loss of property, loss of productivity, and security costs, as well as government costs such as the criminal justice system, medical expenses and victims services. Intangible costs are costs for which there is no easily measured price, such as a loss of quality of life, or losses due to the fear of crime. Willingness to pay estimates are generally higher than the sum of these elements because some aspects are particularly hard to value (for example loss of investment in high crime areas, changes of behaviour due to crime, or the impact on victims' and offenders' families).

Willingness to pay methods are arguably more appropriate for cost of crime estimates because they accurately capture the surplus accruing to society when crimes are prevented (Cook & Graham, 1977). In this way, crime prevention is similar to any other good people might buy. For example, if a consumer is willing to pay \$20 for some chocolate, and someone is selling it for \$5, then he receives a surplus of \$15 by buying it. Note that the surplus is the difference of the eventual money he spends and the willingness to pay of \$20 even if sellers are not realistically going to sell chocolate for as much as \$20. In a similar

way, if society is willing to pay \$20,000 to prevent a crime, and that crime is prevented at the cost of \$5,000, then the crime prevention program has a benefit to society of \$15,000.

However, one limitation to willingness to pay measures is that the methodology assumes that people are well informed about the risks of crime. If there are misperceptions regarding crime in the community, then willingness to pay estimates may not be completely accurate (Mayhew, 2003). For example, if someone thinks that crime is much more prevalent than it actually is, then they might be willing to pay a lot more to achieve a given reduction in crime levels, which will increase the implied willingness to pay to prevent one crime.

In addition, because they are comprehensive, the estimates just give one number, and are difficult to break down in order to estimate the cost to government as opposed to the cost to victims or the cost to the rest of society. For this reason, it may be best to take into account both willingness to pay and more conventional after the fact estimates of the cost of crime when evaluating a crime prevention program.

Year of the Study

Within countries, the general trend in most estimates seems to be that more recent studies report a higher cost of crime than older studies. This is true even after allowing for an increase in the price level of the economy. One reason for this is that the costs associated with crime are increasing faster than the general price level. For example, if people tend to carry around expensive electronics such as phones, GPS systems, or MP3 players more often than they used to, then an increase in the cost of crimes such as theft or robbery should be expected. Costs might also increase if the cost of innovations in the criminal justice system (such as greater security technology in prisons) outpaces the general rate of inflation.

Another reason for an increasing trend in cost of crime estimates is that more recent studies tend to have more sophisticated techniques and make use of more accurate data than older ones. This may be the most important reason behind the increasing trend in estimates, since there is still relatively little research being undertaken in this area. This would suggest that more recent estimates should be preferred over older estimates. However, this does not mean that more recent studies are always more likely to be accurate. For example, a study by Delisi et al. (2010) took earlier willingness to pay estimates (Cohen et al., 2004) and added on tangible costs such as lost productivity and criminal justice system costs to come to very large costs, such as over \$17 million for a homicide. This is not appropriate; willingness to pay estimates are likely to already incorporate these other components, which means that this study is double counting (Lowrey, 2010).

Scope of the Study

Many studies aim to estimate a total cost of crime to society, rather than a cost per crime (for example, Mayhew, 2003; Anderson, 1999). This means that often some costs will not be broken down beyond an aggregate societal level. These total societal cost of crime estimates are generally not practically useful. They cannot be used for evaluation of programs, and they do not even give a sense of the scope of various crime problems unless they are compared with some other sort of benchmark (Cohen, 2000). However, these types of studies are relatively common in the literature.

In addition, while most studies estimate the direct cost to victims as a result of crime, many omit other more removed costs, such as security expenditure, insurance administration, mental health, and criminal justice system costs. Of these, criminal justice costs are the most significant, with Dubourg and Hamed (2005) finding that they represent between 10-20% of the cost of most crimes.

The scope of studies can also be affected by the quality of data available. For example, many US estimates rely on medical expenses collected by the National Crime Victimization Survey, which asks about crimes committed within the previous six months. It is likely that at the point of collection, many victims have not incurred the full extent of medical costs resulting from the crime, which will understate the final estimate (Cohen, 2000).

Type of Crime Examined

Because different studies on the cost of crime examine different legal jurisdictions, there are often differences in the types of crimes in the scope of the study. Furthermore, there may be differences in definition, so that what constitutes a “sexual assault” in Australia may not be exactly the same crime as the same category in the US.

Even if specific charges are the same across jurisdictions, they may be grouped differently. Because the studies are reliant on the availability of criminal statistics, the format that crimes are grouped when recorded can affect the final results. For example, some studies separate out stealing from motor vehicles as a separate offence type, while others look at all theft (other than of motor vehicles) as one category.

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