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ESTIMATING THE INTANGIBLE VICTIM COSTS OF VIOLENT CRIME

PAUL DOLAN, GRAHAM LOOMES, TESSA PEASGOOD AND AKI TSUCHIYA*

Current estimates of the intangible costs of violent crime, such as the pain, grief and suffering experienced by victims, are not very robust. This paper sets out the different methods that can be used to provide more defensible cost estimates, and that use data that are currently available. One of these methods involves estimating the number of quality-adjusted life years (QALYs) that victims of crime lose. The estimates suggest that rape results in the biggest losses, followed (in descending order) by: other wounding, common assault, serious wounding, murder, robbery and sexual assault.

Background

There is growing interest in the UK and elsewhere in finding out how much crime costs society. Calculating the burden, or impact, of crime is useful in a number of important respects. Firstly, together with data on the total numbers of each crime, information about the full costs of different crimes enables us to compare the costs to society of one crime with those of another. In this way, we can determine whether burglary, say, produces a greater burden to society than sexual assault. Secondly, when the numbers of some crimes increase at the same time as the numbers of other crimes decrease, it becomes possible to say something about the trends in the total impact of crime on society if the impact of the different crimes can be compared using a single metric. Thirdly, costs of crime information can be used to inform resource allocation decisions. Information on how much different policies are expected to reduce the overall burden of crime to society can be compared with the costs of those policies, and the most cost-effective policies can be selected.

There are different types of costs associated with crime, some more amenable to measurement than others. Some costs are *tangible* in the sense of being relatively easy to quantify in money terms. These can be broken down into *realized* costs and *anticipatory* costs, and realized costs can be broken down further into direct and indirect costs. Direct costs are those resources diverted from other uses as a result of crimes that have occurred (e.g. resources devoted to treating injuries). Indirect costs are the loss of earnings and productivity that result from victims taking time off work to recover from crime. Anticipatory costs relate to those resources spent attempting to reduce the chances of a crime occurring (e.g. the installation of alarms).

Other costs are *intangible* in that they are much more difficult to measure and quanify. These can also be broken down into realized and anticipatory costs, the former being associated with the pain and suffering that criminal activities inflict upon the victims of

* Paul Dolan, Tessa Peasgood and Aki Tsuchiya, Centre for Well-being in Public Policy and Centre for Criminology Research, University of Sheffield, 30 Regent Street, Sheffield S1 4DA, email a.tsuchiya@sheffield.ac.uk; Graham Loomes, School of Economic and Social Studies, University of East Anglia, Norwich NR4 7TJ.

crime and those close to them, and the latter relating to the fear of crime that potentially affects everyone in society. Reducing such costs as a result of some intervention can be regarded as a benefit. Such intangible benefits may be difficult to quantify but they are potentially very important to people, and therefore need to be given weight when evaluating any proposed intervention. Indeed, in a recent estimate of the costs of domestic violence in the UK, pain and suffering represented 75 per cent of all costs from domestic violence (Walby 2004), emphasizing both the importance of incorporating intangible costs into costs estimates, and the need to ensure they are estimated using a suitable methodology.

Introduction

According to recent Home Office estimates, the consequences of crimes against individuals and households account for £25bn of the £60bn total cost of crime (Brand and Price, 2000). Of this, £17bn is accounted for by realized intangible costs, i.e. the values ascribed to the emotional and physical impact on victims of crime. The authors of that report acknowledged that the figures used to arrive at their estimates were taken from a variety of (not necessarily compatible) sources and involved a degree of ad hoc judgment. These figures are therefore unlikely to serve as a satisfactory basis for longer-term policy. For example, the values ascribed to preventing cases of 'serious wounding' and 'other wounding' were taken, respectively, from the figures used in the transport sector to value the prevention of serious and minor injuries in road traffic accidents. However, the particular nature of the physical injuries and the degrees of consequent psychological trauma entailed by criminal woundings might well be very different from those involved in road accidents.

The aim of this paper is to set out the different methods that can be used to provide more defensible estimates of the values of preventing the intangible consequences of crime, and that use data that are currently available. The focus is on the realized intangible costs of violence against the person (i.e. murder, serious wounding, other wounding, common assault, rape, sexual assault and robbery). The costs will not be disaggregated by the cause of the violence, although, clearly, further interesting questions can be asked relating to attributing costs to different causes, such as alcohol and drug use. The costs estimates are for victims only, who will account for the majority of the losses in well-being, but future research might also consider the external effects on other people, such as the family and friends of the victims of crime, witnesses, family of offenders and possibly even the knock-on effects, via the fear of crime, on more general psychological well-being.

Strategic Overview

There are three general approaches that might be used to value the intangible victim costs of crime. Firstly, try to estimate the intangible costs directly on the basis of people's stated or revealed preferences, i.e. ask people (or else infer from their behaviour) how much they would be willing to pay for some given intangible benefits resulting from a crime reduction measure. Secondly, identify monetary values for health and personal safety used in other sectors of UK policy to see how far they can be transferred into, or adapted to suit, the crime context. And thirdly, identify the nature and extent of the

physical and psychological outcomes of offences and use health state indices to estimate the losses in terms of quality-adjusted life years (QALYs). If we can identify a suitable willingness to pay for a QALY, those QALY estimates could be converted into monetary values.

Therefore, information is required on the injuries and trauma associated with the different offences, the likelihood that a victim of a particular kind of crime will suffer one or more of those injuries or traumas, and some estimate of the duration of that suffering (see the Appendix for details on each). In this paper, the focus is on the categories used for reporting physical injuries in the British Crime Survey (BCS). These are: minor bruise/black eye, severe bruising, scratches, cuts, broken bones, broken nose, broken or lost teeth, chipped teeth, concussion and other injury. Since the BCS is based on self-reports, it does not include manslaughter or murder, so death should be added to the list of outcomes above. In addition, longer-term physical disabilities are added for serious wounding because a small proportion of victims of serious wounding will suffer disabilities of much longer duration. Finally, additional health consequences are considered for cases of rape.

There is no coverage of psychological trauma in the BCS. Therefore, the possibility of developing acute stress disorder (ASD), mild post-traumatic stress disorder (PTSD) and severe PTSD has been considered across all crimes. ASD occurs within the first four weeks of the traumatic event and results in intense fear and/or a sense of helplessness or horror, and is liable to develop into a number of psychological problems such as the avoidance of trauma-related stimuli, re-experiencing symptoms and episodes of increased anxiety/panic. If the person continues to have psychological problems after four weeks that affect his/her behaviour, thoughts and feelings to a sufficient degree, the diagnosis is reclassified to PTSD. Distinguishing between mild and severe PTSD allows the effects of the more traumatizing offences to be captured. The additional psychological health outcomes considered in the case of rape include depression, anxiety and alcohol abuse.

In relation to the likelihood of each outcome by offence type, the BCS includes a series of questions that enable the cross-tabulation of frequencies of different physical injuries by categories of offences (Simmons 2002: Table 6.07). These are taken as the basis for estimating the likelihood of incurring a physical injury in connection with a particular category of crime in the UK. The probability of a victim of a given type of offence developing PTSD is taken from other sources (Riggs *et al.* 1995; Helzer *et al.* 1987; Kilpatrick *et al.* 1992; Harvey and Hermand 1992; Breslau *et al.* 1999). The probability of a serious wounding victim developing longer-term physical disabilities is arbitrarily assumed to be 10 per cent.

In relation to the durations of different physical injuries, these were taken from the Global Burden of Disease (GBD) study (Murray and Lopez 1996). Amongst other things, the GBD study presents a list of 32 injuries selected from the International Classification of Diseases, version 10 (ICD-10), with their 'disability weights' and duration. From this list, those that correspond to our list of physical injuries were identified and their durations used. In some cases, judgment was used to establish this link (e.g. the duration of a broken nose was assumed to be 50 per cent of the duration of a fracture of the face). The duration of ASD and PTSD were taken from other sources (Riggs *et al.* 1995; Davis and Breslau 1998). For longer-term physical disabilities, the duration was set equal to that of severe PTSD.

Direct Values from Revealed and Stated Preferences

The first approach to valuing these physical and psychological health losses involves estimating people's revealed or stated preferences towards averting such losses. The basic idea behind a 'revealed preference' approach is that people's actual behaviour (such as their consumption decisions) can be used to infer the underlying value they place on the benefits in question. But it is extremely difficult to make accurate and robust attributions to individual benefits (like those from a reduced risk of crime), and, for this reason, there is a shortage of useful revealed preference data about the values of preventing the intangible effects of crime (see Cohen 1990).

An alternative is to look at 'expressed' or 'stated' preferences that, unlike revealed preferences, are based on contexts where the preferences do not involve real monetary sacrifices. One way in which some researchers have attempted to estimate values on the basis of expressed preferences is by analysing data from jury awards. It has been argued by Cohen (1988; 1990) that where society has chosen to use a civil court system to redress victims of crime, jury awards should approximate society's assessment of the pain and suffering incurred. In the UK, Criminal Injury Compensation (CIC) awards are derived from a set of pre-assigned tariffs, set by Parliament, for some 400 injuries, with compensation ranging from £1,000 to £250,000 (Home office 2001). Such awards are intended as 'an expression of society's concern for and sympathy with the victim' (a government statement quoted in Miers 1997: 192). Although the size of each amount is intended to reflect the degree of victims' pain and suffering, it is not at all clear how the tariff was arrived at, and so it is far from clear that CIC awards accurately reflect social preferences.

Ideally, we should like to have direct estimates of the intangible costs elicited from a representative sample of the general population using suitable stated preference techniques. In the UK context, there are at present two sources of such data. One of these sources is the 1998 British Crime Survey, where the following question was asked of those respondents who reported that they had been the victim of a particular type of crime: 'Apart from any financial losses, what would be a reasonable financial sum to compensate you for the upset and inconvenience you and/or your household suffered?' The figures for serious wounding, other wounding, robbery and common assault were £2,560, £1,595, £541 and £242, respectively. However, it is not at all clear that respondents were completely disregarding financial losses, particularly when values for other crimes (like theft from a vehicle at £176) were so high.

The other possible source of direct expressions of the intangible victim costs of crime is the results reported in Atkinson *et al.* (2001). In this study, respondents were asked to consider an initial risk of serious wounding, other wounding and common assault, and then asked how much they would be willing to pay to reduce that risk. The mean willingness-to-pay (WTP) to reduce the risk of serious wounding by 0.5 per cent was £106.70, from which a value of the intangible benefit of preventing an incident of serious wounding was calculated to be £21,200. The corresponding 'certainty equivalent' values for other wounding and common assault were of £15,200 and £3,050, respectively.

However, a different form of question—asking simply for the amount respondents would be willing to pay to avoid an attack that would otherwise occur with certainty—gave mean values for other wounding and common assault of £99 and £72, respectively. An alternative to this, which involved asking how much respondents would be willing to pay for an instant cure for the physical harm sustained in an attack (but omitting reference to

the psychological harm), gave values for serious wounding and other wounding of £141 and £95. So the values inferred from the risk reduction questions were between 40 times and 150 times the values from the certain prevention/treatment questions. These rather wide variations, together with a troubling insensitivity to differences between the severities of the physical and psychological harms, make it difficult to have any great confidence in these values.

Transferring Values from Other Contexts

Although there is, at present, a shortage of good revealed or stated preference studies in the context of crime, a great deal more work of that kind has been done in other contexts—and in particular, in the fields of occupational and transport risks. So an alternative approach to providing intangible cost of crime values may be to start with the values for preventing death and/or injury in those other more established areas and consider how far they might transfer into, or be modified to suit, the crime context.

Starting with manslaughter and murder, there are a number of different ways in which the value of preventing a fatality (VPF) has been estimated. The range of revealed preference studies include hedonic wage-risk studies, which estimate wage premiums associated with job fatality risks. On the basis of surveys by Viscusi (1993), Day (1999), Miller (2000) and Mrozek and Taylor (2002), it emerges that the majority of studies (mainly in the United States) produce a VPF somewhere in the region of £1m–£5m. However, there are many well documented problems with revealed preference studies. In addition to the wide range of values, there are ongoing theoretical debates about the correct model to use, and there are questions about the extent to which perceived risks correspond to the actual ones used in the models.

A number of stated preference studies have been conducted to try to overcome some of these problems. A review of studies such as those by Viscusi (1993), Hammitt and Graham (1999), Krupnick *et al.* (2002), Miller (2000), and Perreira and Sloan (2002), again shows the majority of values to be in the £1m–£5m range. However, it has to be borne in mind that many of the stated preference surveys in the health and safety field have also encountered problems similar to those in the Atkinson *et al.* (2001) study: in particular, insensitivity of responses to the size of the risk reduction. What appears to lend them their collective authority is that a number of them produce values that lie in broadly the same range, and which seem to provide a viable basis for policy. For example, the UK Department for Transport (DfT) currently uses a VPF of £1.25m (Department of Transport 2000), and has used a similar value (in real terms) for more than a decade, apparently without causing problems or dissent.

When estimating the intangible losses from murder and manslaughter, Brand and Price (2000) simply took the VPF used in UK road transport. At current prices, the component for the intangible element as reflected by individual willingness to pay for own safety is approximately £1m. Transferring the figure directly into the crime context assumes that there is no significant adjustment to be made, to allow for a different degree of aversion towards being a victim of crime as opposed to a victim of a road accident, or to adjust for any differences in the age profiles of murder victims as compared with road accident victims.

A similar approach might be adopted—at least, up to a point—for non-fatal injuries but few of the available studies provide very good proxies for the kinds of injuries

sustained as a result of crime (see Miller *et al.* 1996; Sloan *et al.* 1998; Perreira and Sloan 2002). However, some studies of non-fatal road injuries may allow stronger links to be made. Following a study by Jones-Lee *et al.* (1995), the DfT accepted that the value of preventing serious non-fatal injuries was roughly 10 per cent of the VPF. The DfT uses a value of £129,000 for the prevention of serious non-fatal injuries and £10,000 for preventing slight injuries (at 2000 prices). Brand and Price (2000) took the intangible element from the serious injury figure and applied it to serious wounding, giving £97,000 (in 2000 prices). However, it should be borne in mind that the figure for the serious road injury was based on a weighted average of values for injuries of varying degrees of severity (see Jones-Lee *et al.* 1995), and that the distribution of severe injuries appears to be very different from the pattern of injuries typical of serious wounding.

If we consider the data for serious wounding in the Appendix, the typical physical injuries sustained in a case of severe serious wounding would appear to be similar to one of the road injury descriptions used in Jones-Lee *et al.* (1995). This injury was labelled 'Injury W' and involved two to three days in hospital with slight to moderate pain, followed by some pain/discomfort for several weeks, some restrictions to work and/or leisure activities for several weeks/months, but a return to normal health with no permanent disability after three to four months. In the study reported in Jones-Lee *et al.* (1995), the mean value for preventing Injury W was about 2 per cent of the VPF. In a later study reported by Carthy *et al.* (1999), that same injury description was used, and the mean value in this case was about 1 per cent of the VPF, with a median value of 0.3 per cent. On the basis of these studies, the prevention of each case of severe serious wounding would be given a mean value of somewhere in the region of £10,000–£20,000, and a median value of about £3,000 (not allowing for psychological distress).

In the road injury study reported by Jones-Lee *et al.* (1995), a slight injury—mostly consisting of (at worst) minor cuts and bruises—was valued at an average of £102 in 1990 prices. If anything, the pattern of injuries involved in common assault—as listed in the Appendix—suggests that the physical injuries from common assault are, typically, less serious than the roads slight injury. But if we take the two to be equally serious, then updating the £102 to current prices would give a figure in the region of £200 for preventing the physical injuries typical of common assault. And if we consider the description of serious wounding shown in the Appendix, with 25 per cent of cases involving fractures, and, on that basis, take a 75:25 weighted average of slight and Injury W to be representative of the serious wounding distribution, we arrive at a figure of between £900 and £5,150 as the value for preventing a serious wounding.[1]

However, those figures all exclude any allowance for the extra psychological distress liable to be associated with the experience of being criminally assaulted. We do not know of any studies giving values for conditions similar to ASD or PTSD. Nor have we found studies giving values that might translate to the patterns of harm sustained in the course of sexual assault. Using costs derived from applying willingness to pay to avoid the risk of injury caused by road traffic accidents to a crime context has very obvious limitations. The type of physical injuries sustained will differ, and the psychological consequences will differ as a result of the very different nature of these events, not least

[1] Weighting the £200 for a slight injury by 0.75 gives £150. To this, we add 0.25 x the median value of £3,000 for Injury W—i.e. £750—to give the lower-bound figure of £900; if, instead, we added 0.25 x the higher mean value of £20,000, we should get the upper-bound figure of £5,150.

because the injuries are deliberately inflicted. Despite this, in the absence of alternative figures, the DoT estimates for serious non-fatal injuries are currently being used to estimate the intangible costs of crimes, such as rape, that are very different from road traffic accidents (Walby 2004). As an alternative to existing attempts to estimate intangible costs, we explore a third approach—the calculation of QALY estimates for each typical injury—which overcomes the limitations of the first two methods and potentially creates a more comprehensive set of intangible cost estimates.

Calculating the QALY Loss of Injuries and Trauma, and Converting to Money Values

The basic idea behind the QALY is that any profile of health can be represented in terms of years of life weighted by some index of health-related quality of life (Dolan 2000). The quality of life measure assigns a score of 1 to full health and 0 to dead, with states regarded as better than dead but not as good as full health being assigned scores between 0 and 1. Thus (leaving discounting aside for the moment), a 10-year profile where seven years are spent in a state valued at 0.75 followed by three years in a state valued at 0.4 is accorded a QALY score of $(7\times0.75)+(3\times0.4)=6.45$ QALYs. Another way of viewing that health profile is as a loss of 3.55 QALYs compared with 10 years in full health. This loss can be calculated directly if we use the difference between those scores and 1. The GBD study referred to above provides such 'disability weights' for the 32 injuries taken from ICD-10, and these are used in this paper (see the Appendix for more details).

For each of the BCS list of physical injuries, a GBD counterpart was identified, which gave both the duration of the injury and its disability weight. In the case of the longer-term physical disabilities associated with serious wounding, it has been assumed that this corresponds to the EQ-5D[2] state 21221 (moderate problems with mobility, usual activity and pain/discomfort, no problems with self care and anxiety/depression). The weights for mild and severe PTSD were taken from a Dutch National Burden of Disease study (Stouthard *et al.* 1997), since the GBD study does not give weights for mild and severe PTSD separately. Acute stress disorder was given the same weight as mild PTSD.

One possible concern is whether or not people are in full health prior to criminal victimization. However, given that the loss in quality of life is measured in terms of absolute decrements, as opposed to proportional losses, the baseline quality of life does not affect the results regarding non-fatal injuries. The exception is murders, where the loss of life in terms of QALYs depends on the remaining life expectancy and expected quality of life of the victim at the time of the murder. To take account of this, age–sex-specific quality of life weights for the EQ-5D have been used (Kind *et al.* 1999).

The advantage of using the disability weights and durations from the GBD work to calculate the health losses from violence against the person is that it offers a set of measures for physical injury that have been assessed all in one study (and although the weights for psychological damage do not come from the same study, they do come from work that may be regarded as broadly complementary). On this basis, DALY scores—i.e. QALY losses—from physical injuries and psychological traumas can be calculated for

[2] The EQ-5D is a generic health state classification system that is widely used in the evaluation of health technologies. It describes health in terms of five dimensions (mobility, self-care, usual activities, pain and mood), and there now exists a set of valuations for each of the health states it describes that is based on the preferences of the UK general population (Dolan 1997).

each offence (except murder, where the figures were derived in the manner explained above). Using a 3.5 per cent annual discount rate (the rate recommended by the UK Treasury: HM Treasury 2002), discounted QALY losses for each category of offence can be calculated. These are set out in Table 1. According to these figures, aside from murder, rape is the worst outcome, and involve between three and 80 times as much quality of life loss as the other offences. Serious wounding is just over six times as damaging as other wounding, and just over 27 times as bad as common assault.

In order to convert the QALY losses into monetary amounts, a 'rate of exchange' between QALY scores and money is required. At present, there are two possible approaches. The first involves looking at the decisions made in recent years by the National Institute for Clinical Excellence (NICE) and teasing out the value of a QALY implicit in NICE's evaluation of health care technologies. Although it has never been explicitly stated, it seems that NICE decisions are broadly consistent with a threshold of about £30,000 per QALY. That is to say, as a rough rule of thumb, treatments which cost less than £30,000 for each QALY delivered are likely to receive NICE approval, while those costing more than £30,000 are much less likely to be approved (Raftery 2001). However, even if NICE were using such a figure, that figure has no firm grounding in preferences; rather, it reflects the judgments of a small group of people who are experts in their fields but whose knowledge and expertise do not extend to include the rates at which members of the public are willing to trade off wealth against health.

An alternative approach is to take monetary value(s) that *have* been elicited from members of the public and calculate their QALY equivalents. For example, consider Injury W discussed above in Section 5. A calculation of the QALY loss entailed by this injury gives a figure of around 0.037. If this is mapped to the median willingness to pay for preventing Injury W as reported in Carthy *et al.* (1999)—i.e. £1,000—this would give a value of a QALY of £27,000, which is similar to the NICE value of £30,000 that underpins the estimates in the third column of Table 2.

However, because willingness-to-pay values are typically much lower than the amounts people state that they are willing to accept (WTA) to compensate for sustaining injuries, and because medians tend to understate means, such a figure might be regarded as rather conservative. An alternative is to take a weighted average of mean WTP and mean WTA as the basis for calculations. Appendices A and B of Carthy *et al.* (1999) discuss four procedures for generating such a weighted average which, between them, give figures in the range £2,500–£5,000. If we want a single figure, £3,000 would appear to be representative of those four estimates. Mapping that amount to the QALY loss of 0.037 gives a value of a QALY of £81,000, which is the basis of the estimates in the fourth column of Table 2.

TABLE 1 *QALY-based estimates of intangible losses*

Offence	Discounted QALY loss
1 Murder	17.79
2 Serious wounding	0.191
3 Other wounding	0.031
4 Common assault	0.007
5 Rape	0.561
6 Sexual assault	0.160
7 Robbery	0.028

TABLE 2 *Discounted QALY losses and money values for those losses*

Offence	Discounted QALY loss	NICE threshold (£)*	Carthy *et al.* weighted average W** (£)
Murder	17.791	533,721	–
Serious wounding	0.191	5,723	15,378
Other wounding	0.031	945	2,539
Common assault	0.007	218	587
Rape	0.561	16,840	45,256
Sexual assault	0.160	4,790	12,872
Robbery	0.028	845	2,271

* Values based on using £30,000 per QALY, inferred from decisions made by NICE.
** An injury with two to three days in hospital, with slight to moderate pain, followed by some pain/discomfort for several weeks, some restrictions to work and/or leisure activities for several weeks/months, but a return to normal health with no permanent disability after three to four months. Values based on using a weighted average of WTP and WTA for injury W of £3,000 (equivalent to about £81,000 per QALY), from Carthy et al. (1999).

TABLE 3 *Total realized intangible victim costs of crime by crime category*

	Annual incidence	(a) Total cost using NICE value (£m)	(b) Total cost using injury W value (£m)
Murder*	1,100*	587	1,100***
Serious wounding	110,000*	629	1,692
Other wounding	780,000*	737	1,980
Common assault	3,200,000*	700	1,879
Rape	61,000**	1,027	2,760
Sexual assault	69,000**	341	916
Robbery	420,000*	355	954
Total		4,375	11,280

* Source: Brand and Price (2000).
** Source: Brand and Price (2000), and Myhill and Allen (2002).
*** The value of preventing a murder is the £1m 'pain, grief and suffering' component of the value of preventing a road accident fatality.

Table 3 combines incidence data with the QALY loss estimates to calculate the total intangible victim costs of violence against the person in the UK in 2001. The overall loss using a QALY value of £30,000 is £4.375bn. Using the Injury W based values, the total is in excess of £11bn. The absolute values differ, but the cost of one crime relative to another remains constant because the only difference between the two columns is the multiplier.

Discussion

This paper has set out three main strategies for estimating the intangible victim costs of crime from existing data. (1) The first involves using direct values from revealed and stated preference studies, and there are three ways of doing this: (a) compensation awards by juries or by the CIC Scheme for criminal injuries; (b) direct willingness-to-accept questions from the BCS for 1998, relating to compensation required following a criminal offence; and (c) direct elicitation of the willingness-to-pay to prevent specified physical

and/or psychological harm from a study by Atkinson *et al.* (2001). (2) The second strategy involves taking WTP values to avoid a (statistical) death or injury in non-criminal contexts (net of tangible costs) and applying them to the criminal context, appropriately modified and re-allocated to the offence categories. (3) The third strategy involves estimating a QALY loss for each offence, which is then converted into monetary values by: (a) using the (alleged) NICE threshold of £30,000 for a QALY; or (b) linking the value of a QALY to the WTP to avoid an injury for which a direct monetary value exists (i.e. Injury W from road accidents).

The merits of each approach can be considered in relation to two key questions: (i) are all the outcomes of a criminal offence covered? and (ii) are the monetary amounts based on preferences? In relation to the first question, in principle, the different variants of approach (1) could cover all outcomes within the crime context. Approaches (2) and (3) focus on physical/psychological outcomes (either in other contexts or in a non-contextual way), and so they may miss important elements. A central assumption for transferring monetary values from non-criminal contexts, and for the QALY approach to provide reliable estimates, is that the value of the loss does not depend on the context of the loss. However, a person's stated preferences relating to a given outcome may well be a function of the context that they are asked to consider in the elicitation exercise. For example, people may value averting a broken nose from a traffic accident differently from averting an identical injury caused by deliberate criminal activity. Although Chilton *et al.* (2002) provide some evidence that the effect might not be as great as previously thought, it is not possible at this stage to assume that the value of the loss in criminal contexts is the same as in other contexts.

If the cause of the difference is respondents' perception that the psychological trauma associated with a given physical injury depends on the context, then, to the extent that this is founded on correct information, a difference in WTP across contexts is legitimate. If criminal victimization involves more severe psychological trauma than accidents, then the WTP to prevent criminal victimization will be higher than in other contexts *with the same physical injuries*. In principle, this should not be a problem if a given 'outcome' is described in terms of all physical and psychological consequences, but, in practice, this may lead to a problem if typical combinations of physical injuries and psychological traumas in the criminal context were not plausible in non-criminal contexts. Or, there may be some psychological traumas that are unique to crime.

In addition, injuries from a criminal assault are caused by the wilful intent of the perpetrator (unlike accidents, where injuries may still be caused by others, but usually not intentionally). This intent to cause harm can result in the victim experiencing losses, even when there are no obvious health effects (or at least, no effects that would be picked by QALY measures used in a health context). The victim may feel more vulnerable or feel that their autonomy has been violated. They may lose confidence and faith in their fellow citizens and in the system if they feel they are not being treated in a fair and just way. Many people claim that their social lives have changed and that their behaviour had been modified after their victimization, and that these changes often lasted for years after the event (Shapland *et al.* 1985). Such considerations might result in there being a 'crime premium' associated with criminal victimization as compared to injuries and psychological trauma in other contexts.

In relation to the second question about whether the monetary amounts are based on preferences, it could be argued that the different variants of approach (1) reflect

preferences. However, they are clearly not all tapping into exactly the same things. With (1a), there is no reason to think that the CIC tariff is securely rooted in public preferences. Approach (1b) is looking at willingness to accept, i.e. the amounts of money that would make up for experiencing various sets of physical/psychological injuries, which might be feasible for the less severe end of the spectrum but becomes increasingly infeasible as we approach the end where people may regard no finite sum of money as adequate (e.g. for murder). Approach (1c) is concerned with WTP for marginal reductions in risks of the consequences of various crimes. It is the preference-based approach most consistent with the premises of standard welfare economic theory, but doubts about its practical feasibility undermine confidence in the subset of values generated by an exploratory study by Atkinson *et al.* (2001).

To the extent that preference-based values have been established in other contexts, and these values are transferable, approach (2) can give appropriate values. But if there are outcomes or other considerations peculiar to the crime context, this approach does not give monetary values reflecting the relevant preferences. At the moment, the quality-of-life weights used in approach (3) are taken from the GBD disability weights, which are not preference-based, although, in principle, these could be replaced by weights which *are* preference-based. The monetary value of a QALY used by NICE is not preference-based but it can be argued that using a 'rate of exchange' derived from the WTP for Injury W gives a stronger preference base.

Conclusions

Current values for the intangible victim costs of crime are not at all robust and looking at the various approaches that economists have used to value losses from death and ill health can provide better estimates. The data currently available on approach (1) are seriously limited, either in terms of scope, relevance or robustness. There is much literature that could form the basis of approach (2), but a specific concern regarding this approach is the extent to which non-criminal injuries can be translated into a criminal context. Approach (3) is a composite of explicitly stated component parts, and thus is amenable to challenge and updating. The present model has many shortcomings (some of which are related to the 'crime premium') but it does represent a promising approach.

Of the two QALY-based estimates (columns (a) and (b) in Table 3), economic theory would favour the figures in 3b on the grounds that these are the only ones pegged to a figure based on the preferences of a sample of members of the public. Having said this, since NICE uses a threshold value for a QALY of around £30,000, using this value in the current context favours consistency across government departments.

In the light of the existing literature, we do not consider the revealed preference approach to be a practical way of valuing the intangible costs of crime. The main problem is the difficulty of separating out the fraction of the prices of preventive goods that relates specifically to the physical and psychological elements of criminal damage. We therefore recommend that stated preference methods should be the focus of future research in this area.

Whatever approach is adopted and however the research is taken forward, there is the need for much better information about the long-term physical and psychological consequences of being the victim of crime. Estimating the total intangible costs of realized

crime has required making many assumptions that could each generate lengthy discussion. It is hoped that this paper will spark debate around this important topic, which will ultimately lead to a strengthening of the methodology for estimating intangible victim costs and improve the accuracy of the data used.

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APPENDIX: *A Review of the Data Used*

The probability of experiencing a detrimental health state

The BCS includes a series of questions that enable the cross-tabulation of different physical injuries by categories of offences, which were taken as baseline probabilities (Simmons *et al.*, 2002: Table 6.07). Additional physical health consequences following rape, such as STDs, abortions and gynaecological problems, are also considered, and the probability of these arising is taken from secondary literature. The probability of a victim of a given offence developing psychological trauma is also taken from secondary literature. PTSD appears to be the most significant psychological consequence of crime. During the first four weeks following a traumatic event, the diagnosis is of acute stress disorder, rather than PTSD (the systems are identical but a diagnosis of PTSD requires the symptoms to have been present for at least four weeks). The probability of each health state for each category of violence against the person is shown the table below.

Serious wounding

	Probability	Source
Physical health		
Broken bones	0.250	BCS (2001/2002)
Broken nose	0.140	BCS (2001/2002)
Minor bruise/black eye	0.220	BCS (2001/2002)
Severe bruising	0.490	BCS (2001/2002)
Scratches	0.280	BCS (2001/2002)
Cuts	0.650	BCS (2001/2002)
Broken or lost teeth	0.120	BCS (2001/2002)
Chipped teeth	0.060	BCS (2001/2002)
Concussion	0.210	BCS (2001/2002)
Other injury	0.082	BCS (2001/2002)
Longer-term disability	0.10	Assumption
Psychological health		
Acute stress disorder	1.000	Assumed 400% of other wounding (with ceiling at 100%)
Mild/moderate PTSD	0.081	Assumed 400% of other wounding
Severe PTSD	0.035	Assumed 400% of other wounding

Other wounding

	Probability	Source
Physical health		
Broken bones	0.00	BCS (2001/2002)
Broken nose	0.03	BCS (2001/2002)
Minor bruise/black eye	0.43	BCS (2001/2002)
Severe bruising	0.56	BCS (2001/2002)
Scratches	0.35	BCS (2001/2002)
Cuts	0.57	BCS (2001/2002)
Broken or lost teeth	0.00	BCS (2001/2002)
Chipped teeth	0.02	BCS (2001/2002)
Concussion	0.04	BCS (2001/2002)
Other injury	0.08	BCS (2001/2002)
Psychological health		
Acute stress disorder	0.550	Riggs *et al.* (1995), 71% of women and 50% of men have PTSD symptoms 2–3 weeks after a non-sexual assault (chose 55% because more assaults are on men)
Mild/moderate PTSD	0.0203	Helzer *et al.* (1987), 2.9% of people in the USA who had been physically assaulted in the previous 18 months had PTSD, assumed 70% of which mild
Severe PTSD	0.0087	Helzer *et al.* (1987), 2.9% of people in the USA who had been physically assaulted in the previous 18 months had PTSD, assumed 30% of which severe

Robbery

	Probability	Source
Physical health		
Broken bones	0.020	BCS (2001)
Broken nose	0.010	BCS (2001)
Minor bruise/black eye	0.180	BCS (2001)
Severe bruising	0.210	BCS (2001)

Robbery (continued)

	Probability	Source
Scratches	0.070	BCS (2001)
Cuts	0.130	BCS (2001)
Broken or lost teeth	0.000	BCS (2001)
Chipped teeth	0.010	BCS (2001)
Concussion	0.050	BCS (2001)
Other injury	0.030	BCS (2001)
Psychological health		
Acute stress disorder	0.550	Assumed the same as for other wounding
Mild/moderate PTSD	0.020	Assumed the same as for other wounding
Severe PTSD	0.009	Assumed the same as for other wounding

Common assault

	Probability	Source
Physical health		
Broken bones	0.0025	BCS (2001), incidence <1, so assumed 0.0025
Broken nose	0.0025	BCS (2001), incidence <1, so assumed 0.0025
Minor bruise/black eye	0.3400	BCS (2001)
Severe bruising	0.0400	BCS (2001)
Scratches	0.0900	BCS (2001)
Cuts	0.0300	BCS (2001)
Broken or lost teeth	0.0000	BCS (2001)
Chipped teeth	0.0000	BCS (2001)
Concussion	0.0025	BCS (2001), incidence <1, so assumed 0.0025
Other injury	0.0100	BCS (2001)
Psychological health		
Acute stress disorder	0.137500	Assumed 0.25 of probability for other wounding
Mild/moderate PTSD	0.005075	Assumed 0.25 of probability for other wounding
Severe PTSD	0.002175	Assumed 0.25 of probability for other wounding

Sexual assault

	Probability	Source
Physical health		
Broken bones	0.007	BCS (1998; 2000), 14% of victims reported some injury, too few victims to determine severity of injury, assumed 0.5 of rape injuries (Myhill and Allen 2002)
Minor bruise/black eye	0.036	As above
Severe bruising	0.021	As above
Other injury	0.006	As above
Psychological health		
Acute stress disorder	0.500	Assumed half of victims experience acute stress disorder
Mild/moderate PTSD	0.157	Breslau *et al.* (1999), 24.4% of females (exposure 9.4%) and 15.7% of males (exposure 2.8%), assumed 70% of cases mild or moderate
Severe PTSD	0.067	Breslau *et al.* (1999), 24.4% of females (exposure 9.4%) and 15.7% of males (exposure 2.8%), assumed 30% cases severe

Rape

	Probability	Source
Physical health		
Broken bones	0.037	BCS (1998; 2000), 37% of victims reported some injury, of these 10% had severe injury (Myhill and Allen 2002)
Minor bruise/black eye	0.192	BCS (1998; 2000), 37% of victims reported some injury of these 52% had slight injury (Myhill and Allen 2002)
Severe bruising	0.111	BCS (1998; 2000), 37% of victims reported some injuryof these 30% had moderate injury (Myhill and Allen 2002)
Other injury	0.033	BCS (1998; 2000), 37% of victims reported some injury of these 9% had other injury (Myhill and Allen 2002)
HIV Diagnoses	0.000001	Department of Health (1999) and Fong (2001)
Gonorrhoea	0.040	Jenny *et al.* (1990)
Chlamydial infection	0.020	Jenny *et al.* (1990)
Trichomoniasis	0.120	Jenny *et al.* (1990)
Bacterial vaginosis	0.190	Jenny *et al.* (1990)
Gynaecological problems	0.000	No data found
Abortion	0.025	Sample in US ($n=4{,}008$) found rape-related pregnancy rate 5% (12–45-year-olds), of which 50% underwent abortion (Holmes *et al.* 1996)
Miscarriage	0.006	US sample ($n=4{,}008$) rape-related pregnancy rate 5% (12–45-year-olds), of which 12% miscarried (Holmes *et al.* 1996)
Psychological health		
Acute stress disorder	1.000	Rothbaum *et al.* (1992) found 94% of women experiencing rape met symptoms of PTSD at 1st assessment (mean 13 days post assault) falling to 65% at 4th assessment (mean 35 days post assault) and 47% at 12th assessment (mean 94 days post assault)
Mild/moderate PTSD	0.343	Kilpatrick *et al.* (1992) found 31% at some point in life, Breslau *et al.* (1999), females 49%. Used the Breslau estimate and assumed 70% of cases mild or moderate PTSD.
Severe PTSD	0.147	Kilpatrick *et al.* (1992) found 31% at some point in life, Breslau *et al.* (1999), females 49%. Used the Breslau estimate and assumed 30% of cases severe PTSD
Drug abuse	0.023	Kilpatrick *et al.* (1992), National Victim Center and Crime Victims Research and Treatment Center. Excluding victims with PTSD, 2.3% more rape victims have two or more major alcohol problems than non-victims (2.1 vs 0.3%)
Alcohol abuse	0.018	Kilpatrick *et al.* (1992), National Victim Center and Crime Victims Research and Treatment Center. Excluding victims with PTSD, 1.8% more rape victims have two or more serious drug abuse problems than non-victims (3.8 vs 1.5%)
Depression (moderate)—short-term	0.200	Kilpatrick, NVAWPRC, National Women's Study (USA) found 30% rape victims had a least one major episode of depression, compared with 10% of women never victimized by violent crime
Suicide	0.001	Assumed 1 in 1,000. Rape victims 13 times more likely to have attempted suicide (Green 1993), suicide rates in UK 6.4 out of 100,000 (for 25–44 females in 2,000) so about 13 times higher would be 83/100,000 or 0.083%
Obesity/eating disorder	0.050	Assumed 5%
Anxiety	0.050	Assumed 5%
Sexual dysfunction	0.780	78% of follow-up sample (Holmes *et al.* 1998)
Unwanted pregnancy	0.025	Sample in US ($n=4{,}008$) found rape-related pregnancy rate 5% (12–45-year-olds), of which 50% underwent abortion (Holmes *et al.* 1996)

Duration of the health states

The durations of different physical injuries were taken from the Global Burden of Disease (GBD) study (Murray and Lopez 1996). In some cases, judgment was used to establish a link between the injury cited in the GBD and that taken from the BCS (e.g. the duration of a broken nose was assumed to be 50 per cent of the duration of a fracture of the face). The durations of psychological conditions, e.g. acute stress disorder and PTSD, were taken from the literature or based on judgment.

Duration of physical and psychological effects

	Duration	Source
Physical health		
Broken bones	0.115	GBD duration for fractured rib or sternum (treated)
Broken nose	0.059	0.5 of GBD duration for fractured face
Minor bruise/black eye	0.0288	0.25 of GBD duration for fractured rib or sternum
Severe bruising	0.0575	0.5 of GBD duration for fractured rib or sternum
Scratches	0.006	0.25 of duration for open wound GBD
Cuts	0.024	GBD duration for open wound (treated)
Broken or lost teeth	0.0192	1 week
Chipped teeth	0.0192	1 week
Concussion	0.0335	0.5 of GBD duration for intracranial injury (short-term)
Other injury	0.0192	1 week
Longer term disability	3	3 years (same as severe PTSD)
HIV Diagnoses	30	30 years
Gonorrhoea	0.0192	1 week (see Dutch study: Stouthard *et al.* 1997)
Chlamydial infection	0.0192	1 week (see Dutch study)
Trichomoniasis	0.0192	1 week (see Dutch study)
Bacterial vaginosis	0.0192	1 week (see Dutch study)
Gynaecological	0	No data
Abortion	0.0192	1 week
Miscarriage	0.0192	1 week
Psychological health		
Acute stress disorder	0.077	4 weeks—based on Riggs *et al.* 1995, recorded prevalence of PTSD symptoms at 2/3 weeks after an assault—under 4 weeks doesn't qualify as PTSD
Mild/moderate PTSD	3	3 years. Breslau *et al.* (1999) found median duration 60 months for women and 24 months for men
Severe PTSD	3	3 years. Breslau *et al.* (1999) found median duration 60 months for women and 24 months for men
Drug abuse	5	5 years
Alcohol abuse	5	5 years
Depression (mild)	5	Long-term: 5 years
Depression (mild)	1	Short-term: 1 year
Depression (moderate)	5	Long-term: 5 years
Depression (moderate)	1	Short-term: 1 year
Depression (severe)	5	Long-term: 5 years
Depression (severe)	1	Short-term: 1 year
Suicide	38	5 years less than loss of years from homicide
Obesity/eating disorder	5	Similar to drug abuse
Anxiety	3	Victims have higher anxiety scores for up to 3 years (Koss *et al.* 1994)
Sexual dysfunction	0.167	Holmes *et al.* 1998, sample of rape victims average 2 months post event, found 78% experiencing difficulties

The loss in quality of life that each health state causes

The quality adjustment weights associated with different physical injuries were taken from the disability weights of the Global Burden of Disease (GBD) study (Murray and

Lopez 1996: Table 4.4). The GBD study presents a list of 32 injuries, selected from the International Classification of Diseases, version 10 (ICD-10), together with their disability weights and duration. From this list, those that correspond to our list of physical injuries were identified and the corresponding disability weights were used. The disability weights for psychological conditions were taken partly from the GBD weights and partly from a Dutch National Burden of Disease study (Stouthard *et al.* 1997), which produced disability weightings for psychological conditions disaggregated by severity. Weights for severe and moderate/mild PTSD and for mild/moderate/severe depression are given separately. Where no disability weights could be found in the literature, e.g. miscarriage and abortion, assumptions were made about how someone in this condition would describe their health on the EQ-5D, and then the tariff value for that state was used (Dolan 1997).

Disability weights

	Disability weight	Source
Physical health		
Broken bones	0.19900	GBD disability weight for fractured rib or sternum (short-term)
Broken nose	0.11150	0.5 of GBD weight given to fractured face
Minor bruise/black eye	0.04975	0.25 of GBD weight for fractured rib or sternum (short-term)
Severe bruising	0.09950	0.5 of GBD disability weight for fractured rib or sternum
Scratches	0.02700	Assumed 0.25 of GBD disability weight for open wound
Cuts	0.10800	GBD disability weight for open wound
Broken or lost teeth	0.11150	0.5 of GBD disability weight for fractured face
Chipped teeth	0.05575	0.25 of GBD disability weight for fractured face
Concussion	0.17950	0.5 of GBD disability weight for intracranial injury (short-term)
Other injury	0.10000	Assumed 10%
Longer-term disability	0.309	EQ5D state 21221
HIV diagnoses	0.13600	GBD disability weight for treated HIV case, aged over 14
Gonorrhoea	0.01000	Dutch disability weight symptomatic acute gonorrhoea
Chlamydial infection	0.01000	Dutch disability weight symptomatic trachomatis infection
Trichomoniasis	0.01000	Dutch disability weight symptomatic trachomatis infection
Bacterial vaginosis	0.01000	Dutch disability weight symptomatic trachomatis infection
Gynaecological problems	0.00000	No data
Abortion	0.71000	EQ5D state 21322
Miscarriage	0.71000	EQ5D state 21322
Psychological health		
Acute stress disorder	0.1300	Dutch disability weight for mild/moderate PTSD
Mild/moderate PTSD	0.1300	Dutch disability weight for mild/moderate PTSD
Severe PTSD	0.5100	Dutch disability weight for severe PTSD
Drug abuse	0.252	GBD disability weight for dysfunctional and harmful drug use
Alcohol abuse	0.180	GBD disability weight for alcohol dependence syndrome
Depression (mild)	0.1400	Long-term Dutch disability weight for mild depression
Depression (mild)	0.1400	Short-term Dutch disability weight for mild depression
Depression (moderate)	0.3500	Long-term Dutch disability weight for moderate depression
Depression (moderate)	0.3500	Short-term Dutch disability weight for moderate depression
Depression (severe)	0.7600	Long-term Dutch disability weight for severe depression
Depression (severe)	0.7600	Short-term Dutch disability weight for severe depression
Suicide	1.0000	Death
Obesity/eating disorder	0.1400	Disability weight for mild depression
Anxiety	0.1700	Dutch disability weight for mild to moderate social phobia
Sexual dysfunction	0.1950	GBD weight for erectile dysfunction
Obsessive–compulsive	0.0800	GBD weight for obsessive–compulsive disorder—treated