Valuing intangible costs of violence: A study of stated preferences and victimisation risks

by

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A thesis
presented to Cardiff University
in fulfilment of the
thesis requirement for the degree of
Doctor of Philosophy

Cardiff, Wales, United Kingdom, 2013

Author's declaration

I hereby declare that I am the sole author of this thesis. Except where indicated by specific reference, the work submitted is the result of my own independent work/investigation and the views expressed are my own. All other sources are acknowledged by explicit references.

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Abstract

   Violence is a considerable burden on society; the costs incurred through treating victims and apprehending the perpetrators combine with economic costs, the emotional victim costs and costs to the community through increased fear of crime to suggest the costs of violence are significant. A growing number of studies seek to quantify the economic and social impact of crime by assessing the aggregate social costs incurred by criminal offending or by examining the consequences of crime at the individual level, focusing on its effect on the general welfare. Regardless of the approach, tangible and intangible costs are always identified, with the first referring to those directly observable and the latter to the unobservable costs that refer to the physical and emotional impact on crime victims. Despite the importance of both, the available estimates of the intangible costs of violence are very limited, especially in the UK context.

   This research set out to investigate this gap and provide a new insight into violence costs with a special focus to the intangible losses incurred by pain and suffering. Stated preferences techniques were developed and applied for this purpose, aiming to determine the monetary values of risk reduction of assault-related injuries as assigned by a UK sample to victimisation risks, contingent on the injury severity and psychological outcome. Novel epidemiological research carried out with British Crime Survey and Accident and Emergency data assisted this application, as the drawn evidence formed the basis for constructing plausible scenarios with a representative description of violent victimisation outcomes. The analyses identified that socio-demographic characteristics (gender, age, ethnicity), quality of life indicators (self-rated health, income, marital status, educational qualifications) and offence-specific characteristics (use of force/violence, sustained injuries, injury severity, severity of the emotional effect, alcohol consumption prior to the incident) were not only linked to victimisation risks but also predicted severe emotional responding. Altogether, results suggested a two-dimensional structure underlying victims' emotional reaction and a similar two-dimensional severity-based structure underpinning the physical aftermath of a violent assault.

   This research concluded with an array of comparable values that denote public's perception of victimisation risks in monetary terms while it highlighted the issues emerging from such an application. The estimation exercise showed that WTP varied extensively across respondents: women were willing to pay more to reduce victimisation related risks and WTP increased with education, age, income and fear of crime. Previous victimisation and difficulty in answering the valuation questions were negative influences on WTP. The numerical findings reflect the importance of victims' costs and provide metrics useful in assessing the cost-effectiveness of crime interventions. Although the contingent valuation method was effective for analysing intangible victim costs providing support for continuing this line of research, further work is required to substantiate its application and strengthen its methodology within the crime context.

Acknowledgements

Above all, my gratitude goes to the Cardiff School of Dentistry for funding this course of study.

Thank you to my supervisors and everyone else who contributed to my work, one way or another, for their support and advice.

Thank you to my family, especially my cherished mom, for their ongoing encouragement.

The greatest of appreciation goes to my partner, who endured both my absence and presence when everything else was falling apart.

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List of Abbreviations

A&E		Accident & Emergency
ABM		Agent-Based Modelling
AIC		Akaike Information Criterion
BAC		Blood Alcohol Concentrations
BCS		British Crime Survey
	NVF	Non-Victim Form (section in the BCS questionnaire)
	VF	Victim Form (section in the BCS questionnaire)
BOS		Bristol Online Surveys
CaRRS		Cardiff and Vale Research Review Service
CCTV		Closed-Circuit Television
CDF		Cumulative Density Function
CFA		Confirmatory Factor Analysis
	AGFI	Adjusted GFI
	BCC	Browne-Cudeck criterion
	BIC	Bayes Information Criterion
	CAIC	Consistent AIC
	CFI	Comparative Fit Index
	CMIN/DF	Chi-Squared/Degrees Of Freedom
	GFI	Goodness-of-Fit Index
	IFI	Incremental Fit Index
	NFI	Normed Fit Index
	PGFI	Parsimony-adjusted Goodness-of-Fit Index
	RMR	Root Mean-square Residual
	RMSEA	Root Mean Square Error of Approximation
	RNI	Relative noncentrality Fit Index
	TLI	Tucker-Lewis Index
CI		Confidence Interval
CIC		Criminal Injury Compensation
CJS		Criminal Justice System
CM		Choice Modelling
CSEW		Crime Survey for England and Wales
CU		Cardiff University
CV(M)		Contingent Valuation (Method)
DBM		Double Bounded Model
DC		Dichotomous Choice
DCE		Discrete Choice Experiment
DETR		Department of the Environment, Transport and the Regions
DSM		Diagnostic and Statistical Manual of Mental Disorders
DSREC		Dental School Research Ethics Committee
ED		Emergency Department
EFA		Exploratory Factor Analysis
ESS		European Social Survey

FBI	Federal Bureau of Investigation
FoC	Fear of Crime
GBH	Grievous Bodily Harm
GDP	Gross Domestic Product
GHS	General Household Survey
GIS	Geographic Information Systems
GNP	Gross National Product
HES	Hospital Episode Statistics
HM Treasury	Her Majesty's Treasury
HO	Home Office
ICVS	International Crime Victims Survey
IRAS	Integrated Research Application System
IT	Information Technology
KM(E)	Kaplan-Meier (Estimator)
KMO	Kaiser-Meyer-Olkin
KW	Kruskal-Wallis
(L)REC	(Local) Research Ethics Committee
LSE	Least-Squares Estimation
(M)CA	(Multiple) Correspondence Analysis
ML(E)	Maximum-Likelihood (Estimation)
M-SASQ	Modified Single Alcohol Screening Question
MSE	Mean Square for Residuals
MTS	Manchester Triage Scale
NCRS	National Crime Recording Standard
NCVS	National Crime Victimisation Survey
NHS	National Health Service
NICE	National Institute for Clinical Excellence
NOAA	National Oceanic and Atmospheric Administration
NUV	Non-Use Value
OE	Open-Ended
OLS	Ordinary Least Squares
ONS	Office for National Statistics
PAS	Patient Administration Systems
PCA	Principal Components Analysis
PDF	Probability Density Function
PMS	Patient Management System
PTSD	Post-Traumatic Stress Disorder
QALY	Quality Adjusted Life Years

SD	Standard Deviation
SMTP	Simple Mail Transfer Protocol
SP	Stated preference
SUS	Secondary Uses Service
TEV	Total Economic Value
UHW	University Hospital of Wales
UK	United Kingdom
US	United States
VSL	Value of Statistical Life
WHO	World Health Organization
WMW	Wilcoxon-Mann-Whitney
WTA	Willingness to Accept
WTP	Willingness to Pay

Chapter 1
Introduction: Thesis Preface

1.1 Summary of the thesis

This research tackles theoretical issues surrounding the nature and measurement of costs that derive from violence with reference to violent victimisation, health and emotional states and general well-being. The research began with a review of the cost of crime literature that identified the lack of a universal categorisation of crime costs and the consent in all available typologies to distinguish tangible and intangible costs, with the first referring to those directly observable and the latter to the rest. Despite the importance of both, the available estimates regarding intangible costs were very limited, especially in the UK context. A number of authors acknowledged this lack and have highlighted their importance in cost effectiveness exercises. The review of the available methodologies indicated the stated preferences technique as the most suitable approach for such an elicitation. While acknowledging the psychological burden violent crime imposes on its victims, it was necessary to conduct appropriate epidemiological research prior to the estimation exercise. This pointed towards the next stage of the research that would provide the information necessary to appreciate and describe this burden by identifying the physical and psychological health characteristics that are typically manifested in victims of crime following a violent assault. The epidemiological research that was carried out provided the necessary insight to the characteristics of victimisation and fed into the aims of the thesis while it built a strong evidence base for the experimental research that followed.

The main objective of this thesis was to investigate the monetary values of risk reduction of assault-related injuries assigned to victimisation risks, contingent on the injury severity and psychological outcome. Five major thematic sections can be distinguished in this thesis. The first refers to the background of this research. This work encompasses the review of the literature in the crime-cost estimation, with the focus placed on identifying existing and previous cost estimates and appreciating the methodologies developed to arrive at those figures. The second invokes the technical aspects of this thesis and refers to the theoretical background underpinning the pretesting and validation procedures and the econometric analysis necessary for the completion of this research. The third emerges from the epidemiological research, which

provided a novel insight into the characteristics and aftermath of violent crime from a victim's perspective and contributed to the outcomes of this thesis as not only it concluded with a concrete and realistic description of the physical and psychological changes expected in the aftermath of suffering a violent assault, it also revealed sensitive issues and latent factors underlying violent victimisation. The fourth and final section appeals to the experimental aspect of this research, including the conduct of pretesting, the main data collection and subsequent analysis and the reporting of the findings.

The interests of this research were organised as follows:

(i) to review the literature in order to identify the most suitable methods for eliciting intangible crime related values,

(ii) to investigating the antecedents and consequences of violent victimisation in widely representative UK samples,

(iii) to develop and validate a stated preference study based on the experimental findings of step ii, and

(iv) to conduct and report the findings of the main study whose aims were:

- to produce monetary estimates regarding victimisation risk reductions using Willingness To Pay (WTP) as a vehicle and the appropriate Contingent Valuation (CV) techniques thereon;

- to examine the elicited values with regard to the injury descriptors;

- to assess the differences in the obtained estimations across the scenarios presented in the survey instrument and

- to specify and interpret a WTP bid function tailored to the data obtained in the survey.

Step (i) followed a narrative approach where a thematic and chronological presentation of the most influential published studies to date that pertained to valuing crime was carried out. Step (ii) employed a number of statistical procedures including explanatory and confirmatory factor analyses and regression techniques to address possible issues concerning heterogeneity in cost estimates, such as socio-economic and demographic predictors of violence, while identifying risk

factors for greater emotional reaction. Descriptive statistics were used to describe and classify assault related injury characteristics to the anatomical sites most meaningful in terms of severity. Step (iii) was achieved through extensive battery work comprising four pretesting stages, including one-to-one interviews, focus groups, verbal protocols and 'field' pilots. The final step used the results from an online survey that recruited 385 members from the general Cardiff population and adopted an econometric approach that entailed a twofold application of parametric and non-parametric techniques to estimate mean and median values of WTP for victimisation risk reduction and assess the resulting estimates.

The first step defined the baseline of this research first by indentifying the lack of available estimates on intangible crime costs, second by outlining the methodological means to approximate these costs and third by concluding that economic valuation is required to estimate such costs. The second step, building on those findings demonstrated that the severity of the physical trauma sustained by victims of crime predicted greater emotional response and that the head was the most susceptible area of the body for assault-related injuries; hence prompting this research to focus upon these features for further investigation. Accordingly, the third step developed and tested the use of these assumptions in CV scenarios in a series of pretesting trials to identify and correct issues in the research procedure, to assess suitability of the stated preference methodology for such a purpose and to determine the appropriateness of the survey instrument.

1.2 Background

A well-functioning market economy requires the structure of well-defined private property rights in which the rightful owner allocates his available resources in the most efficient way. Such an efficient property rights system entails four characteristics: universality, exclusivity, transferability and enforceability (Tietenberg 2003). Universality means that all resources are privately owned and appropriately entitled (Shavell 2004). Exclusivity assumes that all benefits and costs due to owning and using the resources accrue only to their owners (Shavell 2004). Transferability means that all property rights are transferable from one owner to another in a voluntary exchange and enforceability implies that the entitled resources are secure from seizure

or encroachment by non-owners (Shavell 2004). Although such private property rights are fundamental preconditions for the existence of market economies, no real-world property rights system can satisfy all four of these criteria perfectly. Those resources that lack one or more of these characteristics are "public" goods. The more these characteristics are lacking the more complex the allocation and valuation of these resources is.

To overcome this issue in environmental cost benefit analysis, economists use the Total Economic Value (TEV) that aggregates the main values (benefits) provided by a natural resource. These values are mainly function based and accordingly distinguished to use (direct) value and non-use (indirect) value. The use value refers to the value that individuals drive from using environmental resource, while non-use values are the values derived from environmental resources even if individuals themselves do not use them (Birol, Karousakis & Koundouri 2006). A number of economic valuation techniques have been developed to estimate the TEV of resources and these techniques can be applied not only in environmental research but also in the governmental policy and liability legislation context. Particularly for health and safety policy management, decisions about resource allocation, cost-effectiveness of interventions and priority-settings in a sector, such resource valuation is an indispensable tool (see Chapter 2).

1.2.1 Willingness to Pay

Willingness to pay (WTP) is the monetary measure of the value of obtaining a non-market good or avoiding its loss. Simply put, WTP refers to the maximum amount of money (price) that may be contributed (paid) by an individual to acquire a good or service, or alternatively, to equalise a utility change. In mathematical terms, WTP is a Hicksian surplus measure that can be expressed in a number of equivalent ways, in the simplest of which the WTP function identifies the price an individual is willing to pay for a given level of quality, q, given specific levels of price p and utility U (Lusk & Hudson 2004).

Willingness to pay is based on the principle that the maximum amount of money an individual is willing to pay for a commodity is an indicator of the value to him or her of that commodity. It is a crucial determinant of the incentives for product innovation using emerging health

information (Unnevehr, Villamil & Hasler 1999) and an important concept for benefit-cost analysis. In addition, it is one of the principal measures of welfare as it captures the changes in consumer's behaviour attributed to either amendments in prices of goods and services or consumer's incomes. Arguably, the most natural measure of the extent of a person's preference for anything is the maximum amount that s/he would be willing to pay for it. In this regard, Hanemann (1991, p. 635) argued "(...) *The conventional welfare measures for price changes are compensating and equivalent variations, which correspond to the maximum amount an individual would be willing to pay to secure the change or the minimum amount she would be willing to accept to forgo it*". On the other hand, the use of WTP to inform decisions about resource allocation, supposedly based on need, may look problematic because WTP is associated with ability pay. However, this does not necessarily impede the use of WTP at least in the health economic evaluation. Donaldson (1999) demonstrated that WTP is associated with ability to pay based on the association of people's preferences with ability to pay and the disparities of WTP for given options within categories of ability to pay.

Although the concept of WTP is not new (Dupuit [1844]1969; Davis 1963), its first recorded application was by Acton (1976) who used WTP to approximate the value of heart attack prevention. However, it was not until the 1980s that the government Transport Departments worldwide considered using the method to assess the effectiveness of safety projects in terms of lives saved, over the gross output ('productivity') approach used previously (Jones-Lee 1989). This approach to valuation of safety dictates the establishment of the maximum amounts that those affected would individually be willing to pay for (typically small) improvements in their own and others' safety; which are then aggregated across individuals to arrive at an overall value for the safety improvement concerned, thus reflecting society's overall resource constraint. In health, WTP methods historically addressed decision-making by assessing the relative utility of treatments and disparate programmes through patients' and communities' stated values (WTP values for each component under investigation) (Baker et al. 2010). Similar concept applies to the use of WTP measures in an environmental context.

A notion similar to WTP is "willingness to accept "(WTA), which refers to the monetary measure of the value of forgoing a gain or allowing a loss. It is the *minimum* monetary amount

required for sale of a good or acquisition of something undesirable to be accepted by an individual. This term stands in contrast to WTP, which is the *maximum* amount an individual is willing to sacrifice to procure a good or avoid something undesirable. Unlike WTP, WTA is not constrained by an individual's wealth[1]. The finding that WTA measures of value greatly exceed the corresponding WTP measures has received considerable attention creating a debate on the substantive issues of systematic biases in WTP and WTA methods, known as the "endowment effect", or *divestiture aversion*, (for example, see Hanemann 1991). The endowment effect was defined by Thaler (1980, p. 47) as the pattern where "[...] *people often demand much more to give up an object than they would be willing to pay to acquire it*". Simply put, it is a hypothesis that people value a good more once their ownership is established (Gal 2006). Nofsinger (2001, p. 35) referred to the endowment effect as the occasion where "*people demand much more to sell an object than they would be willing to pay to buy it*". Other issues that typically derive from WTP studies concern the "anchoring bias", the "free-rider problem" and the "scope problem". Briefly, anchoring bias refers to the responses that depend on either earlier questions or the actual bid level when the bidding game technique is employed. The free-rider problem refers to the situation where a respondent may not reveal his/her true WTP for the offered 'good', hoping to benefit from others who are actually willing to pay for it. The scope problem describes the situation where the WTP for any 'good' is expected to increase with the number of items being valued. For example, larger number of successfully treated people is expected to have larger WTP values compared to lower number of successfully treated people (in the context of a hypothesised medical intervention). In unconstrained environments where WTP is expected to be independent of the size of the good being valued, the scope effect refers to the noise in the data.

However, the sources of bias differentiate based on what method of WTP elicitation is used; that is direct or indirect. Indirect or revealed preference methods of willingness to pay infer valuation from actual decisions individuals make. Such pricing techniques use information from related markets to impute a value for non-market goods. A related market is one that indirectly reveals values for a good, for example, the value of job safety may be inferred from observing

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[1] For example, the willingness to pay to stop the ending of one's own life can only be as high as one's wealth, while the willingness to accept compensation to accept the loss of one's life would be an extremely high number, perhaps approaching infinity.

whether wage premiums are observed with riskier jobs (Jones-Lee 1992; Viscusi 1993), the change in property prices may be estimated from loss of access to certain infrastructure (roads, schools, etc. see Huggett 2003; Loomis 2004 in Morrison 2009) or from the perceived risk of criminal activity (e.g. Linden & Rockoff 2006; Gibbons 2004). Indirect methods provide respondents with a choice of answers (or tradeoffs) that need to be ranked according to specific features, from which their willingness to pay can be estimated (see e.g. Turner, Giuda & Noddin 2005). The difference between stated and revealed preferences is that the latter infers values from market prices, whilst the former directly asks respondents to state their price on the good under evaluation. Stated preference (SP) methods also employ different estimation tools. As discussed in Chapter 2, the most widely used techniques to obtain WTP estimates are contingent valuation (CV or CVM; direct method) and conjoint analysis (indirect method). Both are hypothetical valuation methods, which use survey responses to elicit consumer's WTP and generate welfare estimates of environmental benefits/damages based on the stated values.

CVM was selected as the most suitable WTP elicitation technique for the context of this study. With just two attributes, the health element and the price associated with it, conjoint analysis was found unsuitable for being the lone way of estimating WTP, in favour of contingent valuation. It must be noted though that one of the drawbacks in contingent valuation is that it does not allow to investigating tradeoffs between several "competing" attributes, but does allow the researcher to focus on specific product attributes (as the health descriptors hereby used). In the view of this, a few aspects of conjoint analysis were kept in this research (rating according to preference options) to investigate the outcomes of using a mixture of direct and indirect elicitation technique.

1.3 Reporting scheme

Chapter 2 presents a review of the literature on costing crime following a narrative approach where a thematic and chronological presentation of the most influential published studies to date pertaining to the context of this research was carried out. The aim of the chapter was to provide a broad overview of the literature relevant to costing violence, to discuss and evaluate relevant methodologies and identify gaps in the literature.

Chapter 3, following the findings on the available measurement techniques employed for eliciting intangible crime related values, presented a methodological overview of the thesis. It sets out the conceptual background to the monetary valuation of non-market effects and provides a brief overview of the contingent valuation method, its uses and implications. The chapter discusses the issues that emerged from the SP application and focuses particularly on the design and development of the survey and the material used towards its implementation. The assessment of the validity and reliability of the survey instrument are discussed alongside the lack of 'golden' standards ('real' markets) in the stated preference methodology. The chapter provides a general overview of the questionnaire outlining the questions and their objectives. This includes: the type of data collected and why it is of interest, the structure of the questions and the techniques used, the relevance of the questions, descriptions of choices, attributes and attribute levels and the structure of the valuation questions including the hypothetical scenarios, the payment mechanism and the elicitation technique. The final version of the survey instrument concludes this chapter.

The review of the literature in Chapter 2 also indicated that the inflicted psychological and emotional stress surpasses the individual's usual psychological defences and the consequences can be chronic especially for victims of violent crime. Acknowledging the effects of victimisation on the victim's health and quality of life, the study next examined the diversity in the manifestation of emotional responses observed in victims of violent crime and investigated the relationship between the inflicted psychological distress and other crime-specific characteristics. Chapter 4 presented the preparatory analyses that served this purpose; the findings aimed at enhancing the insight into the component of violence under interest and for attaining the epidemiological evidence needed to construct a plausible CV survey on intangible costs of violence.

Chapter 4 was divided in two sections, distinction based on the sample used for each study. The first used the 2008/09 British Crime Survey data to identify risk factors for victimisation and emotional distress and demonstrated that the effect of violence on a victim's emotional reaction was elevated when physical interaction between the victim and the perpetrator was involved; i.e. the force used on the victim and the number of injuries sustained during the assault

corresponded with a greater emotional reaction, ceteris paribus. The focus of the first study was placed on the *psychological characteristics* of a violent assault whereas the second investigated the *physical characteristics* of a violent assault, using Accident and Emergency data to explored violence features from a different, more tangible perspective. With the principal objective being to provide plausible descriptions of injuries most prevalent in violent assaults, the second study indicated that a categorisation of injuries to head, torso and limbs corresponded well with the levels of severity reported in the BCS study. The results altogether coupled with the published evidence, provided the means for designing a novel CV survey instrument to investigate the intangible costs associated with violent victimisation.

Chapter 5 evidences the battery work summarising the methodologies and the findings for all the pretesting stages, whose implementation included focus groups, face to face interviews and verbal protocols, pre-pilot and pilot surveys. For each stage, the presentation includes description of data collection procedures, timing and location, sample size and sample characteristics, main findings and how they affected the final questionnaire design.

Chapter 6 reports on the implementation and the results of the main CV survey on intangible victimisation costs. The chapter elaborates on the methodology of the research and particularly focuses on the mathematical and technical background of the implemented econometric analysis. The results of the analysis were presented and discussed separately for the socio-economic and behavioural characteristics and for the contingent valuation exercise.

Chapter 7 concludes the thesis presenting a universal view of all main findings discussed in each chapter, draws out the conclusions and explores their implications and evaluates the contribution of the research.

Chapter 2
The costs of violence: A review of the literature

"The mental suffering and agony, the ruined lives, the broken homes and hearts, the desolation and yearning and despair-who can measure the cost of crime?"

Smith (1901) in Czabański (2008, p. 1)

2.1 Introduction

Violence is pervasive throughout the world and constitutes a major public health concern (World Health Organization 1996). The definition of violence in the World Report on Violence and Health, namely *"(...) the intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, that either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment or deprivation"* (Krug et al. 2002, p. 1084) goes beyond bodily harm to include the countless but less obvious consequences of violent behaviour that yet compromise health and well-being.

Defining crime is far from straightforward despite the fact that it comprises the main feature of criminology and criminal justice. More criminological publications refer to it as a trivial, taken-for-granted concept that is up to each individual, irrespective of their background, to interpret, cite and refer to within their piece of work. This lack of an adequate definition can lead to misinterpretation or even a misunderstanding of the concept that does not allow for generalisation, assessment and debate (Lanier & Henry 2001). Gibbons (1994, p. 45) argues that most of the criminology literature "*settles for the legalistic definition*" that states crime is an intentional act or omission punishable due to violation of the criminal law. Lanier and Henry (2001) suggested that this definition is too narrow, since it does not include the multiple components of the crime phenomenon and thus cannot be employed to incorporate all aspects of the diverse views of such a discipline. More specifically, they suggest that "*(...) so undefined is the field that we may not even be talking about the same thing when we talk about crime*" reinforcing that statement later on by adding "*What counts as a crime in one place in time, culture or location may not be*

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considered criminal at another time, in another culture, or even across the street!" (Lanier & Henry 2001, p. 7).

On the other hand, Czabański (2008) argues that since crime is not a natural but a legal phenomenon, it should be treated as such, suggesting that the criminal justice system is responsible for its definition. A legal definition of crime though, not only presumes that all the criminal acts are registered and codified as lawfully criminal acts but also that such a legal classification of offences will be comprehensive and consistent.

The absence of a universal definition of crime implies that an appropriate definition will each time depend on the context of its use. This thesis supports a normative definition of crime, in which crime is defined as a divergent behaviour that disregards cultural principles that appoint 'normal' human behaviour.

Contrary to the notion of crime where there is a legalistic and a normative distinction, violent crime is more straightforwardly defined because violence is a concept that offends both normative perceptions and individual moral rights. Henry and Lanier (2001) suggest that if violence refers to the use of force toward another that results in harm, then exposure to violence will typically lead to crime. This is reinforced by Farr and Gibbons (1990), according to whom the harm caused by a violent act is classified as a crime against the person. Reiss and Roth (1994, p. 3) further suggested the union of the concepts of violence and crime in their single definition of violent crime as "*behaviours by individuals that intentionally threaten, attempt or inflict physical harm in others*".

2.2 Principal objectives & Methodology

There is a universally growing interest in understanding the costs imposed by crime on the society and the individual (Dolan et al. 2005).

Anderson (1999) employed such an approach to distinguish costs as an anticipation of crime, as a consequence of criminal events and as a response to them. This anticipation–consequence–response categorisation was also employed by Home Office (Dubourg, Hamed & Thorns 2005)

and is the most frequently cited categorisation of costs of crime according to which costs fall in three main categories. These are presented in more detail in the next section.

The objective of this chapter was to provide a broad overview of the literature relevant to costing violence, to discuss and evaluate relevant methodologies and identify gaps in the literature. The chapter focused on the current state of knowledge pertaining to the intangible costs, their measurement techniques and tools developed for their estimation.

The literature review followed a narrative approach where a thematic and chronological presentation of the most influential published studies to date pertaining to the context of this research was carried out. The material presented was not the product of a traditional "systematic" review with a full systematic search, but comprise an abridged version of an extensive review of the key literature, as identified by the author, shortened to reflect the focus of this research. The search initially involved hand and gray literature searching in bibliographies and references in key textbooks and journal articles followed by relevant term searching in abstracting (e.g. PsycINFO, Medline) and citation (e.g. Web of Science, Scopus) databases. A great number of relevant bibliographical sources was used; however, the search cannot be regarded as exhaustive. Despite such an approach is more flexible in constructing themes and has the advantage of refraining from the language restrictions that are often found in non-Cochrane reviews, it can be prone to selection bias due to the lack of stringent search and explicit trial quality criteria (as well as inclusion and exclusion criteria). In addition, publication and language bias could also derive from the use of literature that is readily accessible to the author (Ganann, Ciliska & Thomas 2010).

To ensure that omissions were limited and minimise sensitivity issues attributed to the manual bibliographic searching (electronic and by hand), the study employed a 'snowballing' technique in assessing the bibliography of cited works and the author also conducted systematic screenings of constantly updated citation lists to ensure that the literature that pivotal for this review was acknowledged. This approach technique was suggested by Doust et al. (2005) as the means to increase the sensitivity, precision and accuracy of manual search strategies. In the same vein, research also indicated that a dual or a triangulation of searching techniques is the most effective approach to literature searching, is as it yields more comprehensive results than a single type of

searching alone (Langham, Thompson & Rowan 1999; Hopewell et al. 2007; Ganann, Ciliska & Thomas 2010).

2.3 Costs of crime over time

There is a universally growing interest in understanding the costs imposed by crime on the society and the individual (Dolan et al. 2005). Violence and crime play vital roles in a nation's economy and are considered as great costs imposers (World Health Organization 1996; 2002). As Beccaria (1995 [1764], p. 24) argues, "*the true measure of crime is ... harm to society*". Bentham (1982 [1789]; 1843) adds that policy should be judged through its ability to reduce pain and increase well-being across the population. Brand and Price (2000, p. 3) refer to crime costs as "*a measure of the impact of crime on society*", suggesting that the economic cost of crime could be used as a performance measure for assessing the cost effectiveness of crime prevention measures regarding the severity of the possible offences and irrespective of the total volume of crime. Briefly, crime cost estimates provide a crime measure that allows an evaluation of the resource use efficiency beyond simplistic prevalence data.

However, the idea of costing violence has been of interest for over a century. Smith (1901) was among the first to tackle the issue, generating questions yet to be answered. The first official attempt to tackle the economic importance of crime was introduced by the National Commission on Law Observance and Enforcement (Wickersham Commission 1931) with a "*Report on the Cost of Crime*". The Wickersham Commission presented detailed information on crime costs and criminal justice expenditures, employing methodologies that were innovative for that time. One of the most important conclusions the authors reached was that it was "much more important from an economic standpoint to increase the efficiency of the administration of criminal justice than to decrease its cost", since the monetary losses imposed by the offender were regarded as more important than the importance of administrative law costs. Gray (1979) later on produced a comprehensive review of costing crime methodologies with background information on crime costs and criminal justice expenditures, including information on victims of the costs of crime (e.g. property owners, public sector), victim compensation and

governmental expenditures related to the prevention of crime, providing the backbone of costing crime estimates.

In the United Kingdom (UK hereafter), the Association of British Insurers (1998) provided the first estimation for the total costs of crime citing a figure of £35 billion. In the following year, the Audit Commission Report (1999) gave a higher estimate of £50 billion a year. Brand and Price (2000) offered an estimation of the economic and social costs of crime in England and Wales by placing monetary values on the consequences of crimes against households and individuals. They estimated that the aggregated cost of violent crime imposed a cost of £60billion to the UK economy with approximately one third of this figure relating to the aftermath of the violent acts on victims of violent crime.

In the United States (US thereafter), violence accounts for approximately 50,000 deaths and $2.2 million injuries that require medical attention annually (US Census Bureau 2003). Phillips and Votey (1981) were among the first published studies to include *intangible* costs in their study, referring to the pain and suffering victims endured, to the standard *tangible* costs that refer to directly measurable costs such as lost productivity, medical and criminal justice costs. A number of studies followed investigating the same model (Cohen 1988a; 1988b; 1994; Cohen, Miller & Rossman 1994; Cohen et al. 2004). Miller, Cohen and Wiersema (1996) estimated the total cost of US crime as $450 billion per year, a figure that included aspects of intangible costs. Cohen (1998) later investigated the monetary value of deflecting a high-risk youth from a criminal career resulting in an overall estimate of $1.7 to $2.3 million. Aos et al. (2001) following Austin's (1986) work, attempted to assess the cost-effectiveness of crime prevention interventions in the Washington State, by comparing the costs of crime prevention activity with savings to the criminal justice system. The total cost of savings with regard to crime prevention interventions in the US was found to exceed $70 billion in 2000 (Corso et al. 2007). In the UK context, Brand and Price (2000) inferred that effective crime reduction measures can lead to potential savings "[...] *of around £1 billion*" to individuals and households, businesses and the public sector.

Monetising violence is therefore invaluable in cost-effectiveness assessments, in identifying the most costly crimes and in apprehending the efficiency with which resources are deployed. Moreover, estimates of the social and economic costs of crime alert governmental bodies and

the public on the effect of crime along with its consequences to society, help determine the most effective policy measures and thus improve how resources are most effectively used in crime reduction (Brand & Price 2000). Brand and Price (2000) argue that such estimates are an invaluable aid in policy appraisal and evaluation as they provide the means for comparing the costs and benefits involved with alternative crime reduction measures, while helping policy makers identify priorities according to policies that have the biggest impact on harm caused by crime, in addition to the number of crimes. However, whether cost effectiveness actually targets on preventing crime or mitigating its societal consequences is debatable. As Cohen (1998, pp. 5-6) notes "[...] *Even if shown to be successful in reducing one or more social ill, a key policy question is whether the cost to society from that intervention program exceeds its benefits... Although the costs of intervention programs are often available, the benefits are more illusive*".

Cohen (2005, p. xii) later described another example, in which he refers to the information on violence costs as a "*death of information*[2]". Cohen (2005) commented on the Austin (1986) study on an early release program, which estimated the costs of rape at $350. It was thereby suggested that the cost would not be significantly increased in case a prisoner was released early and recommitted rape, thus the specific program was cost effective since it saved money[3]. Cohen (2005) admitted that this "embarrassing" result lead him to his first cost of crime estimates (Cohen 1988a) where he estimated the cost of rape to be $57,000. Using the same benefit-cost methodology with Austin's (1986) data Cohen (2005, p. xii) reached to the exact opposite conclusions, noting that "[...] *letting prisoners out early in Illinois cost more in terms of the impact on crime victims than it saved taxpayer dollars by building fewer prisons*".

Consequently, monetary expenditures towards crime reduction provide a measure of the overall burden crime imposes to the society. However, to appreciate the dimension of this burden, it is vital to examine all features of crime that can incur costs. Placing a monetary value on the harm resulting from violent crime is not straightforward, especially if the aim is to tackle the emotional consequences of victimisation; i.e. psychological impact of the violent act on victims. The task of enumerating the consequences violence imposes on the community, the

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[2] "*What I found was a death of information on the costs of crime and –more importantly- a serious misuse of the data that was available*" (Cohen 2005, p. xii).

[3] "*Thus if a prisoner was let out early and committed a rape while he otherwise would have been in prison the 'cost' of that failure was estimated to be $350 plus some additional criminal justice processing fees*" (Cohen 2005, p. xii).

victims and the society as a total is challenging and difficult. Most authors agree that there is no one way that costs of crime can be categorized (Czabański 2008). Mayhew (2003, p. 1) agrees suggesting that there is a "*myriad of costs of crime*". Nonetheless, it is important to specify the costs that need to be estimated before the estimation exercise in order to appreciate the not only specific components of costs but also those who bear them. Candidates include the victims themselves, those at risk of becoming victims, the criminal justice system, health services and others.

2.4 Typologies of crime costs

The enumeration of costs depends on the intended audience and policy prescriptions. Direct victims include individuals, households, businesses, organisations and institutions and exclude indirect parties such as family and friends. It is them that face costs as a consequence of crime, through having property stolen, damaged or destroyed, from the opportunity costs of time spent dealing with the crime and through the emotional and physical impacts of crime. Potential victims bear costs in anticipation of crime, through measures to reduce the risk of victimisation (defensive expenditure, precautionary behaviour, and community initiatives), measures to reduce the consequences of victimisation (i.e. insurance), and through reduced quality of life and FoC. Society bears the costs of resources devoted to bringing offenders to justice through the criminal justice process, involving the Police Service, the Crown Prosecution Service, Magistrates and Crown Courts, Legal Aid, and the Prison and Probation Services. Crime involves wider economic distortions, such as the reduction in shops, services, facilities and job opportunities in high-crime areas. Other costs are also incurred as a consequence of crime by employers of victims, victim support services, health and education service, and by the offender and its family.

Despite the fact that these enumerations are very useful when it comes to evaluating the consequences of crime, it is a fact that they comprise more an easily applied approach rather than social benefit-cost analyses. Thus, they should guide valuation exercises instead of leading them in identifying potential cost sources as such enumerations cannot be regarded as complete or sufficient. For instance, one should consider what consequences a certain crime carries for a victim to conceptualise what implications can be involved. In most violent crimes, there is some

obvious damage to the victim (physical consequences) that needs to be addressed through medical treatment, thus direct medical expenses is one cost. The victim of violence will need to take some time off work to recover, in turn introducing the additional cost of lost productivity. The victim may also report the crime to the police and receive the appropriate care from the justice system, which includes the time and the effort that the police (as a unit) will devote in looking to trace and catch the offender or those responsible for the crime itself. In this category, costs of the police, from the salary of the police officers and anyone else involved in the process of catching the offenders to the money spend for covering everyday needs of the police force (e.g. vehicles), are included. In case the offender is caught and brought to justice, costs of jury (prosecutors, judges, prison officers) are added to the previous sum. Lastly, if the offender receives a custodial sentence, an additional cost has to be considered. All these are consequences of violence. Those consequences though describe costs that do not include the psychological or tangible costs to the victim (in case something was stolen, damaged or destroyed), or the offender (lost of productivity due to imprisonment or other costs that are left unpaid due to the crime).

  Demmert (1979), Cohen, Miller and Rossman (1994), Anderson (1999) and Czabański (2008) employed a similar approach to distinguish costs incurred as an anticipation of crime, as a consequence of criminal events and as a response to them. This anticipation–consequence–response categorisation was also employed by Home Office (see e.g. Brand and Price 2000; Dubourg, Hamed & Thorns 2005; Walker et al. 2009) and is the most frequently cited categorisation of crime costs in the UK.[4] Numerous other attempts have been made to categorise violence-derived costs in an effort to produce aggregate estimations that encompass a wider range of costs. Examples include costs of treating victims and apprehending the perpetrators (Dubourg, Hamed & Thorns 2005; DeLisi et al. 2010), the economic costs such as lost productivity (Dubourg, Hamed & Thorns 2005; DeLisi et al. 2010), the emotional victim costs (Dolan et al. 2005; Atkinson, Healey & Mourato 2005; Dolan & Moore 2007; Cohen 2008), the emotional costs incurred by the victim's family or loved ones (Miller, Cohen &

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[4] The estimates by Dubourg, Hamed and Thorns (2005) represent the *unit costs of crime* (by crime type and by cost category) as those incurred (1) in *anticipation* of crime (Defensive expenditures & Insurance administration) (2) as *consequences* of crime (Physical and Emotional impact on direct victims, Value of stolen property, Value of damaged/destroyed property, Value of recovering the property, Lost output due to injuries, Victim services, Health services) and (3) in *response* to crime (Criminal Justice System expenditures).

Wiersema 1996), and costs to the community through increased FoC (Moore 2006; Moore & Shepherd 2006; Moore & Shepherd 2007). McCollister, French and Fang (2010) presented a comprehensive review of studies on the economic impact of crime and concluded that four principal components can successfully capture the costs of crime to society; (1) victim costs, (2) CJS costs, (3) crime career costs and (4) intangible costs. The first three categories reflect tangible costs from which the first component encompasses all the direct economic losses imposed on crime victims including those from medical care, lost earnings and property damage or loss. The second component refers to all types of governmental expenditures (local, state and federal government funds) on police protection, legal and adjudication services, and corrections programs, including incarceration. The third component captures the opportunity costs associated with the criminal's choice to engage in illegal rather than legal and productive activities. The final component holds all the indirect losses suffered by crime victims, such as physical and psychological distress and impact on quality of life.

In line with the costing crime components discussed above, it is clear that there is no clear consensus in the literature regarding which typology should be adopted in calculating estimations, thus researchers each time implemented their own taxonomies for this purpose. Considering that all costing exercises refer to direct and indirect costs, this thesis argues that a unifying concept of all those notions can be the broad division of all those costs into tangible and intangible. These respectively reflect directly observable and indirect, unobservable (hidden) costs incurred by the crime.

Tangible costs include all types of costs that can be assigned to tangible sources, losses or expenditures that involve direct monetary payments (Cohen 2005). Tangible costs are values that carry an already established trade (market) price that does not need to be elicited through proxies or further broken down to secure reliability. Such costs include health care and medical costs, lost wages, stolen/damaged properties, lost output (wage losses), avoidance and deterrence behaviours that can be directly monetised and governmental expenditures that pertain to crime (Police, CJS, incarceration and over-deterrence expenditures). Although tangible costs can be directly observable, the lack of an appropriate accounting system that specifically focuses on crime victims to tally them up complicates the process of an estimation exercise. The lack of available sources adds to the complexity as although some are available (e.g. CJS data,

victimisations surveys such as NCVS and BCS) they were not designed for such a purpose, thus information provided thereby can be inconclusive or unreliable.

Intangible costs encompass "non-monetary", indirect costs that cannot be normally exchanged in private or public markets, such as fear, pain and suffering and lost quality of life (Cohen 2005). Intangible costs refer to pain, suffering, reduced quality of life, fear, feelings of injustice, freedom, happiness etc. Intangible values do not have a readily made trade (market) price and thus need to be estimated anew to reflect the physical and psychological suffering of crime victims in addition to the impact on their quality of life. Such costs require special estimation methodologies and each of those offers a different measurement technique to achieve value elicitation. These methodologies primarily involve indirect measurements that appeal to the notions of opportunity cost and revealed preferences, through the use of proxies for actual but unobservable monetary losses (Cohen 2005).

2.5 Methodological approaches

This thesis follows a holistic approach and distinguishes the crime cost methodologies under Cohen's (2005) cost typology to those eliciting tangible (direct) and intangible (indirect) costs. Although the distinctions are sometimes unclear, the identification of those two type categories is helpful when valuing the costs of crime. In the same vein, literature distinguishes two approaches for estimating tangible and intangible costs; the unit cost (i.e. "bottom up") approach that attempts to assign a price for each of the crime components regardless of tangible or intangible nature and the holistic (i.e. "top down") approach, which attempts to produce aggregate values for the incurred costs. The unit cost approach primarily focuses on the tangible costs or costs within components or sectors of the economy, as it aims at identifying all possible sources that directly influence aggregated estimations, whereas the holistic attempts to produce one value that encompasses the unobservable costs that do not necessarily fall in one category but may overlap if the item approach is employed.

One of the dominant "bottom up" approaches is the Quality Adjusted Life Years (QALY) method , which in the crime literature associates quality adjusted life years with different physical injuries, based on their incidence and association with different crimes, and

subsequently infers the corresponding monetary value (see e.g. Nichols & Zeckhauser 1975; Rosser & Kind 1978; Jones et al. 1989; French & Mauskopf 1992; Miller, Cohen & Rossman 1993; French et al. 1996; Viscusi & Aldy 2003; Dolan et al. 2005). For instance, Dolan et al. (2005) employed a "bottom up" approach to estimate costs of crime and although they incorporated intangible costs in their estimations, they distinguished costs in "anticipation" (including FoC) and as a result of crime (victim's pain and suffering). Thus, they assumed that FoC can only be an element of the "anticipation" category whereas it can be argued that FoC can also be produced as a result of a crime and thus overlap with the "in response to crime" category (also see Brand & Price 2000). Another potential error in this classification pertains to the overlap between avoidance and opportunity costs. Avoidance expenditures serve multiple purposes and depend on the individual's financial well-being. Consequently, uniting these quantities to address only the avoidance perspective implies additional complexity in the estimation exercises as estimating the boundaries of what is being spent solely for avoidance purposes can be very challenging.

Although the unit cost approach has been the most prevalent in the crime literature (Cohen 1988a; Cohen et al. 1994; Wright & Litaker 1996; Miller & Cohen 1997; Cohen & Miller 1998; Brand & Price 2000, Luna et al. 2001; Miller et al. 2001; Dubourg et al. 2005; Miller et al. 2006; Miller, Taylor & Sheppard 2007; Corso et al. 2008), it can overlook victims' costs, such as FoC and resulting aversive behaviours, as it cannot fully encompass all of the cost categories (Nagin 2001) or capture all costs involved (Cohen 2008a).

An alternative approach is thus to estimate costs holistically (i.e. from the "top down"), implementing various techniques that do not distinguish elements to be priced individually and then aggregated but instead calculates a figure that assumes all relevant costs to be involved. McCollister, French and Fang (2010) provided a detailed review of the different methodologies for holistic estimations, including the Willingness To Pay approach (Baron & Maxwell 1996; Ludwig & Cook 2001; Viscusi & Zeckhauser 2003; Cohen et al. 2004; Atkinson, Healey & Mourato 2005), the life satisfaction approach (Frey, Luechinger & Stutzer 2009), market-based modelling (Bartley 2000), life-course models (Macmillan 2000), the numerical crime-ranking method (Roth 1978; Schrager & Short 1980; Evans 1981; Phillips & Votey 1981) and the

property-value method (Thaler 1978; Gray & Joelson 1979; Hellman & Fox 1984; Little 1988; Buck et al. 1991; Buck, Hakim & Spiegel 1993).

In theory, both approaches would yield similar values if the item enumeration in the first is adequately systematic and comprehensive. In practice, there are discrepancies in the values obtained from study to study based on the employed methodology. Although there is merit in both approaches, neither has been yet established as inferior as the first lacks a universal categorisation that adequately incorporate all cost components and the second employs techniques that can severely underestimate or exaggerate the actual costs while it does not allow for a disaggregation of crime cost components. Both approaches may use sources that are not tailored to the needs of the estimation exercise, as for example victimisation surveys, which typically set a time limit on the occurrence of crime and thus neglect long terms costs (e.g. mental health costs; see Cohen & Miller 1998).[5] However, a combination of both would be the best option, as it would allow for some bounding of the resulting estimates.

2.6 Valuing intangible costs

The emotional impacts of crime mostly reflect indirect, intangible costs. However, surprisingly little is known about the costs associated with the emotional impacts of crime, despite their importance in aggregate estimations. Violent crime can have a great emotional impact on its victims, leaving trauma and psychological scaring with significant consequences. Although causations may vary, reactions to violence can involve an acute psychological response with a substantial impact on victims' quality of life (Bisson & Shepherd 1995). A vast literature on the consequences of victimisation reflects its negative effect not only on psychological wellbeing (Weaver & Clum 1996) but also on victims' work, enjoyment, fear and interpersonal relationships. Johansen et al. (2007) note the plethora of simultaneous emotional problems observed in victims of violent assault and concluded that violent victimisation may cause serious chronic emotional problems (e.g. PTSD: Kilpatrick et al. 1989; Breslau et al. 1991; Griffin et al. 1997; Orth, Montada & Maercker 2006; Orth & Wieland 2006). Moreover, research suggests

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[5] Especially for victims costs, Cohen (2005, p. 32) comments on the *'far-reaching'* consequences of victimisation that can be "*beyond the scope of any survey*" citing Dugan (1999) as an example who found that crime victims were more likely to move to a new home following victimisation compared to non-victims.

that physical injury does not affect the likelihood of manifesting psychological trauma, as crime victims are equally likely to develop PTSD regardless of their injury severity (Green 1994; Rose et al. 1999; Wohlfarth, Winkel & van den Brink 2002; Richter & Berger 2006; Johansen et al. 2007). Other emotional consequences that affect quality of life include avoidance and hyper-arousal (Bisson & Shepherd 1995; Brewin et al. 1999; Chilcoat & Menard 2003), whereas Bisson, Shepherd and Dhutia (1997) found that although accident and crime victims show similar levels of depression and anxiety, the recovery of the latter appears to be slower.

Opportunity costs comprise another component of the intangible costs that primarily pertain to avoidance and in essence denote substitute values of resources that can used in alternative ways (HM Treasury 2003). Such costs can reflect both traded and non-traded values; the first refer to sources that directly translate to monetary terms (e.g. security equipment) and the latter encompass activities or time consuming precaution behaviours, such as driving children to school, taking a longer walking route in order to avoid a high crime area etc. Brand and Price (2000) gave the example of the emotional suffering of a person staying at home instead of going on a night out due to fear of victimisation, suggesting that this activity may not be traded on the market but still represents an opportunity cost "*to the extent that person values going out*". The problem with their estimation is the actual crime component in the resulting figures as opportunity can be appointed to more than one purpose, given the plethora of reasons for a certain outlay aside minimising victimisation risks. For example, security expenditures aim at protecting both property and its owners whereas other reasons for driving children to school are convenience and road safety (Brand & Price 2000). In addition, they reflect measures taken by individuals in an attempt to reduce the victimisation risks that reflect not only their awareness and understanding of these risks but also their financial prosperity. Thus, the individual's ability to pay constitutes another significant influence as not the same financial wealth to consider such expenditures applies to everybody. Many people at low risk of victimisation spend considerable amounts of money for security, whereas others at higher risk lack that choice[6].

In the same vein, Fear of Crime (FoC) or fear of victimisation (Warr & Stafford 1983) is a similar commonly acknowledged component of intangible costs of crime that may also reflect opportunity. It refers to the public's perception of victimisation risk (i.e. the subjective

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[6] A relevant phenomenon is the co-called Fear of Victimisation Paradox; see Chapter 7.

probability) as opposed to its actual probability (Hale 1996; Farrall, Jackson & Gray 2007) and encompasses feelings, thoughts and behaviours that reflect individual's perception of victimisation risks; features that may significantly influence not only the individual's quality of life and but also community's cohesion (i.e. trust and neighbourhood stability) by introducing (unwanted) changes to routine activities and habits and contributing to avoidance behaviours (Hale 1996; Stafford, Chandola & Marmot 2007; Jackson & Stafford 2009). FoC can adversely impinge on the quality of life (Audit Commission 1999).

   Although FoC is an expected loss, it refers to an intangible concept that cannot be directly valued. Numerous publications are available on the perception of such fear but very few tackle the actual costs that FoC itself induces to the individual and by extent to society. That is probably because such costs can be also accounted for in other crime-cost categories. For instance, the purchase of protective gear (e.g. burglar alarms) is an act in anticipation of crime that can also reflect FoC as a consequence of a previous incident of burglary. In an effort to separate the costly actions that fear induces to public, purchases or changes in routine activities, several measurement techniques have been suggested over time. Such techniques use different qualities as proxies for fear to estimate the implied average societal costs. The impact on quality of life is one of the most direct proxies used for fear and assumes that fear induced people take precautionary actions to levitate their quality of life but fear left as a residual has an opposite effect. The drawback with this approach is that both "fear" and "quality" stand for subjective values that vary in the public's perception.

   For instance, BCS tackles this issue by asking respondents: "*How much is your own quality of life affected by fear of crime, on a scale from 1 to 10, where 1 is no effect and 10 is total effect on your family life?*" Mirrlees-Black et al. (1998) refer to FoC as the physical disorder that links public's crime apprehension to more serious crime. More specifically, Mirerlees-Black et al. (1998) found that a significant correlation between levels of fear (scale 1 to 10) and levels of crime in a specific area. Their results demonstrated that in areas were the FoC was at higher levels, higher also were the victimisation levels (domestic burglary, vehicle theft and violence) compared to areas with lower levels of fear (Mirrlees-Black et al. 1998). That means that the actual victimisation rate of an area deeply influences the FoC as perceived by the residents in the specific area, and accordingly the levels of fear as perceived by the public can reflect the amount of violence that takes place in

that area. Bolling et al. (2002) confirmed these results, suggesting that crime apprehension is linked to the FoC[7].

Research also reports correlations between crime concern and self-reported physical and psychological health (Ross 1993; Adams & Serpe 2000; Chandola 2001; Kruger, Reischl & Gee 2007). As Dolan and Peasgood (2007, p. 125) note "*fear of crime can impact directly on people's psychological health through experiences of worry and anxiety, and it may also impact indirectly on physical and mental health*". Hale (1996) claimed that fear has a negative effect on the psychological well-being. Dolan and Peasgood (2007) further investigated Hale's (1996) claim by reviewing the literature on the manifestation of fear and concluded that fear reflects on health either through health-reducing behaviours (McCabe & Raine 1997; Dowdell & Santucci 2003), or due to recurring experience of intimidating conditions (Elstad 1998; Ross & Mirowsky 2001). Other studies reported that fear reduces physical (Ravenscroft, Uzzell & Leach 2002; Seefeldt, Malina & Clark 2002; Kilgour 2003) and social (McCabe & Raine 1997; Patsios 1999) activity and is usually related to reduced health (Kawachi et al. 1997; Kawachi, Kennedy & Glass 1999; Lindström, Hanson & Östergren 2001; Kennelly, O'Shea & Garvey 2003; Wen, Browning & Cagney 2003; Lochner et al. 2003; Lindström 2004). However, Jackson and Stafford (2009) argue that most of those findings come from self-report data hence cannot substitute longitudinal studies that use objective measures of physical and psychological health.

In review, there is a growing literature that attempts to elicit monetary values out of the intangible effects of violent crime; especially from the pain and suffering imposed on victims and victims' families by injuries or death (see e.g. Cohen 2007; 2008). However, due to the significance of the intangible cost components and the controversy in their estimation, methodological developments are ongoing and none of the employed estimation techniques has established its superiority in the context of crime. All eligible methodologies use proxies for estimating such values as no technique can directly monetise intangible concepts. For instance, studies in the US employed jury awards for estimating the costs of intangible losses to victims of crime (Cohen 1988b; Cohen, Miller & Rossman 1994; Miller, Cohen & Wiersema 1996). In the UK justice, juries do not usually award monetary compensations, other methods were preferred

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[7] Respondents were asked how much of a problem they thought of violence or other social disorders in their area. Bolling et al. (2002) found that those living in inner-city areas and council estates with high levels of physical disorder were particularly concerned about crime and the fear of crime.

instead. Brand and Price (2000) for instance, assumed the costs to victims, employers and health services of fatalities and serious and slight injuries from violent crime to be approximately equivalent to those observed in road traffic accidents. Employing estimates from UK public transport (DETR 1999) they transferred the relevant values to the crime context to approximate the costs of the physical and emotional consequences of violent crime. Atkinson, Healey and Mourato (2005) employed contingent valuation for estimating the public's WTP prices on reducing the victimisation risks, whereas Dubourg, Hamed and Thorns (2005) used a number of sources including BCS data to estimate the cost of emotional impact based on assessing responses through QALY methodology. However, the design of victimisation surveys does not allow for accurate estimations, as obtained responses do not always reflect the intangible component of crime in terms of cost. Consequently, further applied research is required for valuing intangible costs as unreliable estimates amongst others influence the appraisal or evaluation of several policies.

The revealed preferences, the stated preferences and the life satisfaction studies comprise the most frequently cited approaches for a holistic valuation of intangible costs. The measurement techniques used in these methodologies provide in essence different proxies (tools) to approximate (transfer) the intangible concepts into monetary terms monetary values include Willingness To Pay and contingent valuation (CV) techniques, QALYs, shadow pricing, property prices, jury awards and combinations of those that provide hybrid approaches. Table 2:1 presents the key papers on the crime literature that include estimation for intangible losses and summarises the employed methodology and findings. A more detailed description of the three principal methodologies and the measurement techniques used thereby follows.

Table 2:1 Key papers on the intangible costs of violent crime

Author/Yr	Good/Scenario Valued	Valuation Method	Administration Mode	Sample & Sample Size	Findings
Cohen (1988)	The monetary cost of individual crimes by examining the pain, suffering and fear endured by crime victims.	Jury Awards	N/A	Estimates were based on victim's risks of injury and death which were then monetised using court awards in personal injury cases for similar injuries and previous VSL estimates.	The cost to individual victims: $43,562 - $51,058 (rape) $7,459 - $12,594 (robbery) $4,921 - $12,208 (assault) $181 (larceny) The cost per individual household of motor vehicle theft was $3,127. Total aggregate cost of victims was $92.6 billion annually.
1998 British Crime Survey	Victims were asked: "*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?*"	Open-ended question	Self-completion survey Face-to-face interviews	Repeated cross-sectional study with a multi-stage stratified random sample (n=14,947)	Mean values: £242 (common assault) £541 (robbery) £1,595 (other wounding) £2,560 (serious wounding)
Cook & Ludwig (2000) Ludwig & Cook (2001)	Net benefits of different gun control programmes by asking respondents' WTP for 30% reduction in gun violence Scenario: "*Suppose that you were asked to vote for or against a new program in your state to reduce gun thefts and illegal gun dealers. This program would make it more difficult for criminals and delinquents to obtain guns. It would reduce gun injuries by about 30%, but taxes would have to be increased to pay for it. If it would cost you an extra* [$50/$100/$200] *in*	CV Elicitation format: referendum format (double-bounded dichotomous choice) The selection of the tax increase was randomly determined and if the answer was positive the amount was doubled, if negative the amount was halved and the question was repeated.	Telephone survey	A nationally representative sample of 1,204 American adults	The 30% reduction was worth $24.5 billion (in 1998 dollars) Estimated WTP to reduce gun assaults by 30%: $24.5 billion (in 1998 dollars); i.e. $1.2 million avoid one gun injury Estimated VSL≈$5.4-$6.8 million

	annual taxes would you vote for or against this new program?"			
Brand & Price (2000)	Emotional and physical impact on victims for three crime types (excluding CJS and other costs)	Estimates were based on costs of road injuries by transferring the values of preventing a fatality (VPF) accordingly based on the characteristics of the employed crime typologies.	N/A		Intangible costs per incident: £120 (other wounding) £240 (common assault) £12,000 (sexual offence) £97,000 (serious wounding)
Mayhew (2003)	The costs for a classification of offences tailored to the Australian CJS. Intangible cost estimates were also provided for violent and property crime under the transfer scheme employed by Brand and Price (2000).	Followed Brand and Price (2000) unit-cost methodology. A multiplier was calculated for each crime representing the ratio between the number of crimes estimated by the survey that recorded by the police. For violent crime, the values were calculated based on the intangible costs of road accidents produced by the Bureau of Transport Economics (BTE 2000). For property crime, the UK estimates were used.	N/A	Used data from the Crime and Safety Survey (ABS 1999) For the estimation of the intangible costs, the adopted BTE values for road accidents were based on jury awards funded by compulsory third-party insurance for motorists.	Intangible figures per incident: $150 (other theft and handling) $ 260 (theft from motor vehicles) $300 (no injury) $300 (criminal damage) $500 (injury not requiring medical treatment) $800 (assault) $800 (residential burglary) $800 (non-residential burglary) $1,200 (sexual assault) $1,300 (theft of motor vehicles) $1,500 (robbery) $2,100 (for injury requiring medical treatment) $17,000 (offences resulting in hospitalisation) $380,000 (homicide) The resulting figure averaged across all cases was $800 per

					incident.
Cohen et al. (2004)	WTP for 10% reduction of 5 crimes (burglary, armed robbery, assault, rape/sexual assault, murder) Scenario: Respondents were asked their WTP for a 10% crime reduction in three randomly chosen kinds of crime. For every kind of crime, a respondent was asked whether s/he would pay an amount chosen from the range $25-$225 (in $25 intervals). Next, that amount increased or decreased by one level based on whether the initial answer was positive or negative.	CV Elicitation format: bidding game	Telephone interviews using a random digit dial sample of 4,966 phone numbers.	A nationally representative sample of 1300 US residents aged 18 or over.	Estimated WTP for 10% reduction $104 (burglary) $110 (armed robbery) $121 (serious assault) $126 (rape & sexual assault) $146 (murder) Implied WTP for crime $25,000 (burglary) $232,000 (armed robbery) $70,000 (serious assault) $237,000 (rape & sexual assault) $9,700,000 (murder)
Atkinson, Healey & Mourato (2005)	The costs of three violent crimes in the UK context; i.e. common assault, other wounding & serious wounding Three health scenarios were attached to the studied crimes: (i) No injury & short-term mental distress(*repeated recollections of assault, feel shaken for a few hours after the assault, symptoms last for 1-2 days*) (ii) Moderate physical injury (*cuts and grazes, extensive bruising to body and face, no medical attention required,*	CV Elicitation format: payment card (range: £0-£5,000)	Face-to-face interviews	A national representative sample of 807 England & Wales inhabitants (279 protests included)	Estimated crime cost based on: Mean WTP £5,282 (common assault) £30,908 (common assault) £35,844 (common assault) Median WTP £913 (common assault) £5,342 (common assault) £6,196 (common assault)

bruising to the body, minor physical discomfort for 3 weeks followed by complete recovery) & medium-term mental distress(*repeated recollections of assault, difficulty falling asleep after the assault or staying asleep-1 or 2 nights each week, difficulty concentrating on daily tasks, symptoms last for 2 weeks*)

(iii) Serious physical injury (*concussion, cuts needing stitches, two broken ribs, immediate medical attention required and 2 nights in hospital, pain and discomfort for a month followed by complete recovery*) & long-term mental distress (*repeated recollections of assault, difficulty falling asleep after the assault or staying asleep: 1 or 2 nights per week, difficulty concentrating on daily tasks feelings of nervousness symptoms last for 6 months*)

The injury descriptors were based on BCS data

Each respondent was randomly assigned to one crime and asked his/her WTP for a 50% reduction of that crime within the next 12 months

Dolan et al. (2005)	Intangible victim costs of violent crime.	Methodology based on the use of Quality Adjusted Life Years	N/A	The baseline probabilities for physical injuries by	Intangible values based on *(i) using the NICE threshold of*

(QALYs): the physical injuries and impacts on mental health associated with the consequences of violent crime were translated to QALY estimates, which were in turn converted into monetary values.

Two thresholds (£) per QALY were employed as a *"rate of exchange"* between QALY scores and money:

(i) £30,000 per QALY (inferred from NICE evidence)

(ii) £81,000 per QALY (assumed equivalent to the losses from serious injury ('*Injury W8*', see Jones-Lee, Loomes & Philips 1995; Carthy et al. 1999).

categories of offence were calculated using data from the 2001 British Crime Survey. The probabilities of a victim of a given offence developing psychological trauma and of additional physical health consequences for rape were taken from secondary literature. Several assumptions were made for the probabilities regarding the impact of crime on psychological health where no information was available.

£30,000 per QALY:
  £533,721 (murder)
  £5,723 (serious wounding)
  £945 (other wounding)
  £218 (common assault)
  £16,840 (rape)
  £4,790 (sexual assault)
  £845 (robbery)

Total realised intangible victim costs:
  £587m (murder)
  £629m (serious wounding)
  £737m (other wounding)
  £700m (common assault)
  £1,027m (rape)
  £341m (sexual assault)
  £355 (robbery)

(ii) using the Carthy et al. (1999) weighted average of WTP and WTA for injury W (approx. £81,000 per QALY):
  £15,378 (serious wounding)
  £2,539 (other wounding)
  £587 (common assault)
  £42,256 (rape)
  £12,872 (sexual assault)
  £2,271 (robbery)

Total realised intangible victim

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[8] The injury labelled 'Injury W' 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 (Dolan et al. 2005).

				costs:
				£1,100m (murder)
				£1,692m (serious wounding)
				£1,980m (other wounding)
				£1,879m (common assault)
				£2,760m (rape)
				£916m (sexual assault)
				£954m (robbery)
Dubourg et al. (2005)	Emotional and physical impact on victims for three crime types (excluding CJS and other costs) Aim was to provide estimates of intangible costs of non-fatal violent crimes in terms of health loss.	Methodology based on the use of QALYs following the approach of Dolan et al. (2005) described above,	N/A	British Crime Survey data on the incidence of various health impacts of crime were used to calculate the QALY loss coefficients for each impact.	Estimated intangible costs per crime (i) £218 (common assault) £945 (other wounding) £5,723 (serious wounding) (ii) £587 (common assault) £2,539 (other wounding) £15,378 (serious wounding) Aggregated values for emotional impact per incident: £788 (common assault) £4,554 (other and serious wounding)
Bishop & Murphy (2011)	WTP to avoid a 10% increase in violent crime violent crime and the comparison of values deriving from two hedonic models: their dynamic model and the	Hedonic models where a dynamic model of household choice was estimated to calculate WTP.	N/A	A two sided panel dataset (compiled from the merged data of housing transactions and	The dynamic model implied a mean WTP of $472 per year per household for avoiding a 10% increase in violent crime, suggesting substantial

traditional model			
	By introducing moving costs into the hedonic framework, the problem was broken into a two-part, discrete-continuous decision, allowing for the application of recent advances in the estimation of this class of model.	crime rates) describing the Bay Area of California between 1990 and 2008 (n = 369,015)	preference heterogeneity in the observed characteristics of income and race. The estimates from the traditional model suffered from a 21% downward bias understating the respondents' joint WTP willingness to pay to avoid a single additional violent crime by approximately $278,870 per year.

2.7 Revealed preferences

This approach is based on the revealed preference theory[9] (Samuelson 1938) which suggests that consumers simultaneously price a range of options and select the optimal one whilst deciphering the value of such a choice. In practice, revealed preferences are techniques that derive the values of environmental goods and services from market prices using models that describe observable behaviours, such as travel cost and random utility models and hedonic pricing methods (United Nations 2003). From those, only hedonic pricing has been applied in the context of crime to elicit crime cost estimates.

Hedonic pricing in crime literature refers to hedonic methods of decomposing prices of market goods to extract embedded values for crime related attributes, such as housing prices and differences observed thereby considering the crime rates in the specific area (Khalid 2010). Briefly put, such an approach examines actual transactions in the property market to infer related crime values. Thaler (1978) was the first to apply hedonic pricing in the crime context to estimate how much crime rates influenced house prices and by extent isolate the part of the housing price ascribed on crime. Thaler (1978) used a variety of variables denoting house characteristics (e.g. square feet, number of rooms, age of the house) and location properties (e.g. housing prices, crime rates, tax rates, school quality, distance from city centre) to examine their effect on the purchase value. Cohen (2007) later suggested the further use of multiple regression to infer marginal Willingness to Pay values based on the regression coefficients. Such marginal values 'reveal' the effects of crime on housing prices as according to the preference theory potential victims will consider crime levels and other crime related variables before purchasing a property. The application showed that controlling for other factors, price was significantly and negatively associated with crime rates; i.e. properties with lower prices were found on areas with higher victimisation levels (Thaler 1978; Rizzo 1979; Hellman & Naroff 1979). Brand and Price (2000) agree, suggesting the use of property prices as indicators of quality of life perceptions in areas with different crime rates. They favoured the use of revealed preferences in estimating values of reduced quality of life given that the hedonic pricing technique allows the elimination of all -irrelevant of fear and crime- factors that determine property's demand, supply and price (Brand & Price 2000).

A number of authors employed the same technique to update and enhance Thaler's (1978) findings. For example, Hoehn, Berger and Blomquist (1987) and Bartley (2000) attempted to

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[9] The initial terminology was "selected over".

elucidate the effect of specific crimes (e.g. burglaries, thefts, sex assaults) on the property prices to elicit marginal WTP values for safety improvements in potential victims' living environment. Hoehn, Berger and Blomquist (1987) found that aside from the property prices, crime rates also affected wage rates. Assuming that a range of environmental and urban conditions (including violent crime rates) would affect both housing prices and wages, they employed housing and wage hedonic equations to assess differences in wage and property values with the occurrence of a specific crime in a given area attributable to these amenities. Despite the statistical significance observed in their models, Hoehn, Berger and Blomquist (1987) questioned the generalisation of their findings in an interregional context due to the inconsistent character of their employed amenity measures. Viscusi (1993) suggested an alternative method of examining the influence of crime rates on wages, by assessing differences in wage rates across areas susceptible to crime to estimate the coefficient for a variable pertaining to the worker's decision on accepting an increased risk of death. Bartley (2000) later examined correlations between specific crime incidents and the property values observed at that time and looked at how crime rates affected people based on their income. His findings suggested that crime rates affected more people of lower income category, thus supporting Levitt's (1999) hypothesis of a stronger crime effect on the relatively poor. In a more recent study, Bishop and Murphy (2011) used a dataset compiled from the merged data of housing transactions and crime rates in the Bay Area of California (n = 369,015) and found that the total average WTP per household for avoiding a 10% increase in violent crime was $472 per year (in 2011 dollar value).

In the UK, Gibbons (2004) found that property prices in London were highly influenced by specific types of crime observed in that area. For instance, Gibbons (2004) reported that anti-social behaviour or criminal damage (e.g. vandalism, graffiti) were more influential on the housing prices compared to other crime types (e.g. burglary). Thus, building on Brand and Price (2000) he suggested that aside from property prices, such criminality indicators could also be used as quality of life indicators by (potential) residents, mentioning that these types of crime "*motivate fear of crime in the community and may be taken as signals or symptoms of community instability and neighbourhood deterioration in general*" (Gibbons 2004, p. F441).

However, Gibbons (2004) focused on the association of prices and low-level crimes, omitting other crime categories and hence did not consider the influence of other higher-level crimes (e.g.

homicide) on presidents' perception of safety. An alternative perspective is that visible conditions influence people's perceptions of safety rather than specific crime types as implied by Gibbons'(2004) study. In the US, Linden and Rockoff (2006) also attempted to look at specific crime types (focusing on sexual assaults) in an effort to isolate their effect on the housing market. Using appropriate sex offender registries, they deduced that from the time sex-offenders move into a given area there is an approximately four percent reduction in the local property market.

In review, hedonic techniques carry uncountable advantages as they depend on observable market data that can be easily obtained and linked with other secondary data sources. The main disadvantage is that their application may disregard incidents of great value in aggregated estimations due to their unobservable effect on housing prices. For instance, although FoC can be allied to "[...] *an urban phenomenon used as metaphor for the quality of life*" (Bannister & Fyfe 2001, p. 807) not all types of crime can be captured through hedonic modelling. As Cohen (2007) notes, other types of crime (such as domestic or child abuse) cannot be reflected through property values and wages and thus are likely to be underestimated using standard revealed preference techniques. An effective solution for this issue is offered through experimental methods for eliciting preferences such as the stated preferences technique, which in effect uses hypothetical settings to construct a simulation market.

2.8 Stated preferences

The stated preference (SP) approach comprises a set of pricing methods that estimate monetary values for resources, by asking people their subjective evaluation of situations that involve monetary transactions. Stated preferences are experimental methods based on direct surveys of individuals through which people can be asked how much they would agree to pay to avoid an undesirable change (Willingness To Pay) or how much they would ask for as compensation to secure an improvement (Willingness To Accept), or to rate different alternatives (tradeoffs in choice modelling) (United Nations 2003). The difference between stated preferences and revealed preferences is that the latter infers values from market prices, whilst the former directly asks respondents to state their price on the good under evaluation.

Stated preference methods comprise two principal estimation techniques, contingent valuation (CV) and choice modelling (CM), technique also known as conjoint analysis. While both generate welfare estimates of environmental benefits/damages based on willingness to pay measures, the employed elicitation concept differs significantly. CV is a direct elicitation technique that directly asks respondent's valuation on certain non-market goods whereas CM infers that value based on their stated choices (or tradeoffs) or the rankings they provided for those goods considering specific features.

Although both techniques are methodologically similar, CM originates in the market research and transport literature (see e.g. Hensher 1994) whereas CV was developed for environmental valuation purposes (Bateman et al. 2002). Briefly, CM encompasses a range of stated preference techniques (e.g. choice experiments, contingent ranking and rating and paired comparisons) that describe an asset in terms of its attributes or characteristics alongside the levels that may pertain thereon, to determine those that are significant determinants on their value (Bateman et al. 2002). The difference with the CV is that is does not directly ask for willingness to pay but elicits a marginal value according the way respondents rank different components and attributes incorporated in a range of scenarios. For example, Turner, Giuda and Noddin (2005) conducted CM to estimate the total economic value of an environmental resource, that of two national parks in Maine. They constructed five scenarios with varying levels of different attributes (including monetary references) and inferred WTP values for each of those attributes according to the respondent's ranking.

On the other hand, in CV respondents are again presented with a hypothetical occurrence through a scenario description but are then directly asked how much they would be willing to pay to either avoid a negative occurrence or bring about a positive one. The name derives from the concept that the obtained monetary values are contingent upon the nature of the constructed (hypothetical or simulated) market and the good described in the survey scenario. CV was originally used to value environmental and public goods but has been extended to the determination of WTP for other types of 'goods' for which a market does not yet exist, i.e. non-market goods such as the welfare impacts of changes in public policies or projects, or social benefits that do not have direct market analogs (e.g. improvements in air quality, saving endangered species, reducing the risk of early death; Cohen et al. 2004). The method usually requires the use of surveys or questionnaires but there is a variety of ways through which the survey can be communicated. The main survey modes are mail surveys,

telephone or face-to-face interviews and computer-assisted interviews. Mixed modes are also used but more as they are more expensive to conduct. Regardless of the mode though, the text of a typical CV survey consists of:

"(1) an introductory section which helps set the general context for the decision to be made; (2) a detailed description of the good to be offered to the respondent; (3) the institutional setting in which the good will be provided; (4) the manner in which the good will be paid for; (5) a method by which the survey elicits the respondent's preferences with respect to the good; (6) debriefing questions about why respondents answered certain questions the way they did; and (7) the collection of a set of respondent characteristics including attitudes, debriefing questions and demographic information" (Carson, Flores & Meade 2001, p. 179 in Czabański 2008).

Questions can also be posed in a plethora of ways although there are two generic question types: open-ended and closed-ended. In an open-ended question (direct open-ended format), respondents are asked to state the maximum amount they would be willing to pay to obtain the good in question. In a closed ended question, respondents are asked whether they would be willing to pay a specified amount to obtain the good in question through bidding procedures or referenda (yes/no) vote. Econometric analysis techniques are then carried out on the obtained dataset to estimate and extrapolate WTP values to the sample's population.

The great advantage of contingent valuation is its flexibility as it allows the valuation of a wider variety of non-market goods that cannot be otherwise estimated. However, it suffers from a number of drawbacks, some of which draw from using WTP as a measurement of preferences; e.g. the implied costs of the required extensive pre-testing and survey work, the complexity in the data analysis and the difficulty in validating externally the estimates of the calculated non-use values (lack of "golden standards"; see Chapter 5).

2.8.1 Contingent valuation in the context of crime

The growing body of costing crime research indicates the rising public interest in whether rational policies are applied towards crime. In a society of limited resources, crime costs estimates dictate more coherent public policy assessments, as it helps their effective allocation (Cohen 2000; Czabański 2008). Criminological literature indicates that there is a variety of methodologies developed for this purpose, with benefit cost analysis being in the frontier of those (Cohen 2000).

The classification of the costs precedes the task of valuation in the sense that costs should firstly be identified in order to be quantified in monetary terms. This chapter has provided a brief description of the classifications most typically met in the cost of crime literature to conclude that there is no one way that such costs can be categorised. That is mainly because of the plethora of costs that can be attributed to crime and violence. Consequently, a broad categorisation that captures all types of costs is that of tangible and intangible expenditures. The calculation of the "tangible" costs has been deemed feasible (e.g. direct medical expenses, CJS expenditures). Other "intangible" costs, such as the cost of the psychological impacts on the individual, and by extent to society, are harder to estimate if not impossible. That is because such costs involve greater subjectivity and may therefore be prone to externalities that are not directly relevant to victimisation, such as gender, age, and socio-economic status. Regardless of the difficulty in their estimation, intangible costs account for a large part of crime costs that should not be ignored (Cohen 2000).

Contingent valuation offers one of the most useful and available tools in estimating such non-market values and is applied by asking public's WTP for reduction in risks associated with violent crime, or alternatively how much they would be willing to accept (WTA) in compensation for an increased level of risk (Carthy et al. 1999). Despite its numerous applications in a variety of contexts and disciplines, such as health (Zarkin, Cates & Bala 2000; Krupnick et al. 2002; Marra et al. 2005), safety (Jones-Lee, Hammerton & Phillips 1985) and the environment (Bateman, Langford & Graham 1995; Wiser 2007), only a small number of studies have applied contingent valuation techniques to the context of crime. This section reviews the most pioneering works to demonstrate the way CV methodology is applied in the context of crime.

Cook and Ludwig (2000) and Ludwig and Cook (2001) were among the first to apply CV to assess the net benefits of different gun control programmes. Their focus particularly on gun violence was motivated by the growing policy concern about this issue and the lack of any indicators on the cost effectiveness of such programmes. Simply put, the costs of similar interventions in terms of budget expenses were roughly known; it was their benefits in terms of crime reduction that had to be monetized[10]. Hence, the public good in question for their research was "(...) *freedom from the ex ante risk of victimisation*" (Ludwig & Cook 2001, p. 208). Using referendum-type questions, they surveyed a

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[10] Such as assessing the cost-effectiveness of funding crime-control programs that would prevent injuries to victims whose identity is not yet known (Ludwig & Cook 2001, p. 208).

national sample of 1,200 adults asking their willingness to pay through an increase in annual taxes for the implementation of a programme promising a 30% reduction in gun violence. The authors developed an analytical strategy based on the works of Cameron and James (1987) and Cameron (1998), using maximum-likelihood estimation (MLE) techniques to refine their estimates and obtain a "societal" value of WTP. The MLE estimates indicated a mean and median household WTP equal to $203, aggregated to $20.8 billion, or around $1 million per injury. More explicitly, assuming that the individual reported on the total dollar value that their household would be willing to pay to fund this program they estimated that such a reduction was worth $24.5 billion (in 1998 dollars). This aggregated value was obtained by multiplying the mean WTP ($239) per individual (in the text referred as household) by the number of US households (equal to 102.5 million in 1998; US Census Bureau 1999). Similarly, the WTP value to avoid one gun injury was calculated as $1.2 million, value obtained by dividing the aggregated value of WTP by the estimated annual incidence of assault-related gunshot injuries (68,900 in 1998) multiplied by 30%. Considering that only some proportion of injuries was fatal, the authors estimated the value of a statistical life to $5.4-$6.8 million. In terms of influential factors, their analysis suggested that WTP was positively associated with income and the number of children in each household.

Despite the invaluable insight Ludwig and Cook (2001) offered to the cost of crime literature, their study entailed a number of assumptions. First, the authors assumed that the individual reported on the value that represented his/her households' WTP rather than the value that they themselves would pay. Second, they assumed that the average respondent would have a good estimate of the risks and consequences of gun violence as their CV scenario lacked debriefing information such as the baseline risks of being a victim of a gunshot injury and which part of the population would benefit from the program. Third, they included "protests" in their analysis by conveying "no" to zero; nonetheless, the implemented sensitivity analysis suggested that their estimates were robust to assumptions about the distribution of WTP. Fourth, in terms of the survey design, their CV scenario lacked intelligibility as it was asking respondent to vote and provide a valuation at the same time. Finally, it must be noted that the assumptions mentioned above afflict the employed aggregation strategy as neither the unit of observation has been clearly selected (individual/ household) not the units interviewed provided complete responses. Hence, the extent and the nature of the relevant 'aggregation population' cannot be identified, as who exactly is the beneficiary of the total value of

the good in question is unknown. However, similar issues plague all CV studies to some degree. Thus, the criticism should focus on the aims of the study, which were the cost benefit analysis of gun control, instead of answering generic questions about costs of crime. Cohen et al. (2004) addressed this question in a later study.

Cohen et al. (2004) employed CVM to assess public's WTP for the reduction of five crimes; i.e. burglary, armed robbery, assault, rape or sexual assault, and murder. The study was administered by telephone to 1,300 US residents asking the individual's WTP for a 10% crime reduction in three randomly chosen types of crime. The CV scenario entailed that the reduction would be carried out by the means of an on-going crime prevention programme in the respondents' community and required them to vote "yes" or "no" on a proposal that demanded the payment of a selection of pre-specified monetary amounts (bids) for this purpose. The questioning mode was quite complex as the respondent had to vote "yes" or "no" to a series of available bids ranging from $25 to $225 in a randomised order of $25 intervals. Depending each time on whether the initial response was positive or negative, the bid increased or increased by one level until the maximum bid was reached for each individual. Then, the same bid was kept throughout the remaining crime types. The scenarios deliberately did not include any additional baseline information on the crime risks and consequences such as crime rates, victimisation risks, average losses, or severity of injuries typically related to each type of crime. One reason was the authors' interest in the elicitation of "true" valuations; i.e. values based on the publics' own perception and awareness, in an effort to learn from the public what value it puts on these perceived risks (Cohen et al. 2004). Another reason possibly was to reduce the embedding effect expected if such an option is incorporated in the CV scenarios. The authors concluded that the average annual WTP of a household ranged between $100 and $150 for a 10% reduction of crime in the respondent's communities, with the amount increasing with crime seriousness (for example, $104 for burglaries, compared to $146 for murders). Briefly, WTP ranged across the specified crimes and reported elicited mean values were $111 for burglary, $126 for serious assault, $122 for armed robbery, $147 for rape and sexual assault, and $147 for murder (in 2000 dollar value). Aggregating their findings in the same manner[11] with Cook and Ludwig (2000)

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[11] Using an estimate of the number of crimes avoided with a 10% reduction in crime rates and considering the existence of 103 million households in the US the authors were able to estimate the cost per type of crime. Using the WTP amount of $146 in the case of murder, globally the American people would be willing to spend around $15 thousand million in the programme ($146 x 103 million). Dividing this amount by the number of murders averted with a reduction

and Ludwig and Cook's (2001) they derived a marginal WTP to prevent crime of about $25,000 per burglary, $70,000 per serious assault, $232,000 per armed robbery, $237,000 per rape and sexual assault and $9.7 million per murder. These findings were very consistent with Cook and Ludwig's (2000) and Ludwig and Cook's (2001) estimate of $1 million per nonfatal gunshot injury.

Their analytical strategy followed the methodology outlined in Haab and McConnell (1997; 1998). Briefly, assuming that the WTP amounts would decrease as the bid level increases, they defined a monotonically decreasing WTP function, which was then smoothed (at its local fluctuations) to secure this property. Regarding WTP bounds, they followed a very conservative approach by assigning the mid-point as the "true" WTP value, hence ignoring the stated preferences that exceeded that value. Then they calculated the WTP probability density function whose integration provided the basis for the value elicitation. The respondents' answers were transformed into WTP for crime reduction, by multiplying a percentage of people that would not pay more than a certain amount by this amount and by summing across categories[12]. Subsequently, they used multivariate logistic regression to predict the probability of a "yes" vote based on the mean respondent characteristics and explore influential factors on WTP for each crime type. They concluded that in all cases WTP decreased with the bid level; i.e. as the cost of crime prevention increases the WTP decreases. Not surprisingly, age, ethnicity and low income were amongst the significant variables where WTP bid amounts (for most crime types) were significantly lower from older people and from low-income level. Low income respondents typically provide lower willing to pay bids despite they are more prone to victimisation risks, highlighting the expected association between WTP and "ability to pay" in CV exercises.

Although Cohen et al.'s (2004) methodology was robust, the small reduction percentage they used and the high figures they obtained (e.g. see Viscusi 1993; Miller, Cohen & Wiersema 1996; Cohen 1998) is a concern. The authors purported that this inflation could be attributed to the fact that respondents might overestimate the risks and the injuries sustained by violent crime, thus eliciting higher values of WTP. Another explanation can be that they did not specify a crime control policy in

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of 10% in its number it is possible to estimate an implicit value of a statistical crime of $9,700,000 in the case of murder (Cohen et al. 2004).

[12] A given percentage of people willing to pay was multiplied by a mid-point between the amount they agreed to pay and the next bid, on the assumption that while they agreed to pay, say $200 and not $225, we cannot be sure that they are not going to pay $220.

their CV scenario, nor they defined the crimes or provided information on the prevalence, risks or tangible losses associate with each. On the other hand, whether a comparison of values elicited with methods other than the CVM is valid is open to discussion. Given the lack of debriefing information in their scenario, it is safe to assume that the elicited valuations are based on the respondent's understanding of the crimes involved, hence reflecting the actual levels of fear and concern in the community. Consequently, their study stands as proof that CVM can be applied for the estimation of the intangible costs of crime, hence providing support for continuing this line of research. The later study by Atkinson, Healey and Mourato (2005) grounded this belief, addressing directly the issue of violence-related intangible costs.

Atkinson, Healey and Mourato (2005) were the first to apply CV in the UK context. They developed a novel survey-based study that predominantly aimed at directly valuing some of the intangible effects of violent crime. Based on a convenience but quota-based split sample design, they conducted 807 face-to-face interviews[13] using the payment card format. Adopting the classification used in BCS (Kershaw et al. 2000) they constructed three offence profiles that contained a comprehensive description of symptoms that corresponded to the effects suffered after the crime offence on the welfare of the victims. Respondents were prompted to select a value on a payment card with amounts that ranged from £0 to £5,000 that represented the maximum they would be willing to pay for each level, through an increase in local taxes for law enforcement, for reducing their victimisation risk over the following year by half. They derived to an implied value of a statistical crime of £5,282 for no injury (common assault), £30,980 for moderate injury (other wounding) and £35,844 for serious injury (serious wounding). The average WTP price for the intervention was between £100 and £180 per year.

Atkinson, Healey and Mourato (2005) adopted a robust analytical strategy, similar to that by Cohen et al. (2004), providing both parametric and non-parametric estimations for the mean and median WTP values of their study[14]. They employed survival functions to model the payment ladder responses for the non-parametric estimation and they utilised Cameron and Huppert's (1989) framework to parametrically model their CV data with interval data maximum likelihood models (also see Hanemann & Kanninen 1999). The parametrical approach also allowed for further

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[13] In total 523 responses were used due to "protesting" and extreme outlying values.
[14] Their econometric modelling techniques were outlined in Bateman et al. (2002).

assessing the role factors such as respondents' perception of safety/ FoC/ police effectiveness and aversive behaviour, played in determining WTP. Their econometric model indicated that that WTP varied across respondents, being positively influenced by crime severity (higher for the crime profiles with injury; significant at 5% for other wounding and 10% for serious wounding), income level (significant at 5%), higher education attainment (significant at 5%), FoC (significant at 10%), aversive behaviour (significant at 5%), trust in police effectiveness (significant at 10%) and difficulty in completing the questionnaire (significant at 5%); assuming all else is held constant. Surprisingly, they did not detect a significant influence on WTP from the respondents that had been victim of crime in the past, though the coefficient was positive. This could be explained by the small proportion of respondents in the sample with previous experience of victimisation (7.1%). On the other hand, it could also reflect the importance of the remaining determinants.

In contrast with the other works outlined in this section where respondents were asked to value a risk reduction from an unspecified baseline; Atkinson, Healey and Mourato (2005) provided a concrete baseline through their comprehensive description of the outcomes of each CV scenario and by prompting respondents to consider carefully its relevant profile before stating their valuations. Respondents were also given a "pre-policy risk" type of assessment, which informed them on the risks involved in being a victim of a violent assault tailored for the UK context; namely 1% for other wounding and serious wounding and 4% for common assault. However, as the authors acknowledged, such crime rates vary considerably across demographic, socio-economic and geographic regions. One of the issues in this research is one typically met in the literature and regards the high rate of "protesting". Authors calculated that proportion at 30% but determined that no corrections were necessary to reimburse for this issue as the difference between the groups (respondents protesting vs. not~) was not statistically significant to suggest the occurrence of sample bias. Another concern was the specification of a quite high percentage risk reduction incorporated in their scenarios (50%), referred to as "risk insensitivity" (Jones-Lee, Hammerton & Phillips 1985; O'Reilly et al. 1994; Beattie et al. 1998). To correct for this issue authors used visual aids[15] as recommended in Corso, Hammitt and Graham (2001). However, the 50% reduction seems quite optimistic and regardless of the precautionary measures that were taken, it might influence

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[15] For each profile, they provided two grids with shaded and non-shaded squares describing the likelihood of being a victim of the offense before and after the implementation of the risk reduction intervention.

respondents' valuations toward the higher end, as, one would expect respondents' WTP to be much higher considering the level of the corresponding risk reduction. Authors probably aimed at capturing the maximum WTP value for the maximum reduction percentage possible, but the suggested intervention might not be realistic. Nonetheless, whether the interventions described in the CVM should represent reality in absolute terms or whether the values elicited from such hypothetical interventions are still credible or significantly affected by such reduction percentages, constitutes a controversy in the CV literature (Hammitt & Graham 1999; Corso, Hammitt & Graham 2001).

2.8.2 Criticisms of Contingent Valuation technique

While CVM is straightforward and allows specifying particular kinds of crime, it has also been criticised. List and Gallet (2001, p. 241) conducted a meta-analysis on a number of valuation exercises and concluded that "[...] *in hypothetical settings subjects overstate their preferences by a factor of about 3 (on average) with the degree of this over-revelation being influenced by the distinction between WTP and WTA, public versus private goods and other elicitation methods*". On the other hand, Carson, Flores and Meade (2001) did not report any systematic bias in their findings. An example adopted from Czabański (2008) follows to appreciate the scope of this argument.

As detailed earlier, the CVM offers a way to estimate publics' WTP for a given 'good', as for example a public policy regarding safety. Regardless of experimental characteristics or environmental elements, all individuals spend money or make decisions that directly related to their safety or private protection, such as buying anti-crime devices (e.g. locks, alarms), choosing appropriate place of living or changing their behaviour (e.g. taking taxis rather than walking). However, the level of private expenditures will be influenced at all times by public's assessment of the current public expenditures. If they fall below their optimal level (the optimal level being set at the level that of the aggregate WTP), people will presumably compensate this underinvestment by private expenditures. If public expenditures are more cost-effective than private, people would be willing to shift resources from private precautionary measures to tax founded public programs. Therefore, the increase in public expenditures due to revealed WTP for crime reduction may lead to the decrease in private expenditures on protection. As a result, the total reduction in crime costs can be lower than expected because of the increased public spending. The fact that WTP for public programs does not

cover all costs that people are ready to bear for averting crime calls for inclusion the private expenditures as well. Some researchers claim that private expenditures only shift crime from a victim who has taken some precautionary measures to another, but it will not reduce the total number of crime, and therefore should not be included in measuring the WTP for crime reduction. Mikos (2006) opposed to such a view claiming that even if private precautionary measures shift rather than reduce crime; they will still reduce the total burden crime by shifting crime from the most sensitive victims to the more "resistant" ones (Czabański 2008).

Diamond and Hausman (1994) claimed that the controversy of CV was particularly influenced by Exxon Valdez catastrophe. The high valuation of ecological loss due to the catastrophe motivated Exxon to seek any flaws in the methodology of evaluation. Despite the motives, the discussion has been fruitful (see Cook & Ludwig 2000, pp.98-100). CV relies on hypothetical situation; therefore, one cannot be sure that people would behave the same way in reality, issue known as "hypothetical bias". The evidence on that point is mixed. For example, the report of the NOAA (Arrow et al. 1993) recommended dividing the results of CV studies by a factor of 2 to get close to the true valuation. On the other hand, what is true valuation is questionable. Sometimes, the results can be compared with those estimated with revealed preferences method, experimental results or another willingness to pay study. Not all differences however may be attributed to flaws in CVM, as other methodologies are not perfect as well (Freeman 2003). Freeman (2003) concludes that the controversy in the available evidence only supports the application of the CVM as a stated preference approach but not without caution. The NOAA report (Arrow et al. 1993) outlines a number of prerequisites for a CV study to be deemed reliable; notably the usage of referendum format, the level of familiarity of the questions to the respondents, the provision of adequate information (including alternative and "no answer" options), the cautious use of any visual aids and the comprehensive collection of socio-demographic data that accurately describe the survey sample. Freeman (2003) added the importance of an internal validity check to assess whether CV findings conform to the economic theory or to the general economic predictions, as for example, whether WTP decreases with price/tax and increases with income. These recommendations still hold true with the exception of the referendum format (discussed in Chapter 3). The works of Mitchell and Carson (1989) and Bateman et al. (2002) ascertain the qualities that should be present in every application of the CVM.

Overall, CV is a valid method of estimating people's WTP in the crime context, with previous research supporting its applicability to the violence arena. As all methodologies, it knowingly entails a number of limitations. To mitigate some of the concerns about the CVM validity, WTP results should not be used not for themselves but as means of deriving relative values.

2.9 Life satisfaction approaches

Life satisfaction studies are based on a retrospective assessment of subjective well-being. The life satisfaction approach has been referred to as a 'hybrid' of the revealed and stated preferences methods (Cohen 2007, p. 25) due to the plethora of their shared characteristics. Life satisfaction studies are conducted through surveys that among others ask respondents their subjective evaluation of their satisfaction with life. They do not ask for monetary valuations but for a general assessment of respondents' life satisfaction to capture the experienced utility and to elicit reports of global life satisfaction or happiness (Kahneman & Krueger 2006). The text of a typical question is phrased as: "*All things considered, how satisfied are you with your life as a whole these days*?" (World Values Survey, see Delhey 2009) or "*Taken all together, how would you say things are these days? Would you say that you are very happy, pretty happy, or not too happy?*" (General Social Survey, see Davis, Smith & Marsden 2005). It is common for surveys on welfare to include such metrics to provide an estimate of an individual's value of happiness, satisfaction or safety, as for instance the BCS, or the European Social Survey (ESS).

There is a growing interest in surveying the public's subjective well-being (Kahneman & Krueger 2006; Cohen 2008). However, only a few surveys address the effect of crime on happiness in a quantitative way. Analyses either attempt to identify influential factors on public's quality of life (Michalos & Zumbo 2000; Kahneman & Krueger 2006; Di Tella & MacCulloch 2006); socio-demographic conditions where income (Easterlin 1995; 2001; 2003) marriage and sex (Blanchflower & Oswald 2004) are associated with happiness, or environmental conditions that affect life satisfaction (van Praag & Baarsma 2005). In the crime context, only FoC has been tackled using life satisfaction approaches with the more distinctive applications being outlined below. The 1998 British Crime Survey offered a similar alternative source of intangible estimates through its victim module, where victims were asked: "*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 mean values were calculated to £242 for common assault, £541 for robbery, £1,595 for other wounding and £2,560 for serious wounding. Although the robustness of the obtained responses is questionable, research by Brand and Price (2000), Mayhew (2003) and Dubourg, Hamed and Thorns (2005) used this question in their methodology.

Michalos and Zumbo (2000) and Di Tella and MacCulloch (2006) studied life satisfaction using regression techniques and although they reported that crime had a negative effect on happiness, they did not attempt to monetise their findings. Cohen (2007) later achieved that employing Di Tella and MacCulloch's (2006) research material and calculated the value of an aggravated assault to approximately $550,000 (in 2000 dollar value); that is approximately eight times the WTP price for the same crime category previously estimated by Cohen et al. (2004). Dubourg, Hamed and Thorns (2005) and Dolan et al. (2005) combined life satisfaction data with QALY methodology to elicit intangible costs based on health loss.

Mayhew (2003) offered an assessment of costs of crime in Australia following the methodology suggested by Brand and Price (2000) and adopting some of their estimates in the absence of suitable Australian data. The resulting figure for intangible costs of a common assault (no injury), averaged across all cases was $800 per incident (in 2003 dollar value). Mayhew (2003) employed a classification of offences for which he estimated individually the intangible values for assaults according to their outcome. More specifically, the figures per incident were $17,000 for offences resulting in hospitalisation, $2,100 for injury requiring medical treatment, $500 for injury not requiring medical treatment and $300 for absence of injury (Mayhew 2003, p. 25). Brand and Price (2000) estimated the emotional and physical impact of common assault and sexual offence to £240 and £12,000 respectively per incident. Furthermore, they also presented the corresponding estimates for all personal crimes in three subcategories, 'all violence against the person (VAP) excluding homicide', 'more serious VAP' and 'less serious VAP'. The figures presented in the report were £12,000, £97,000 and £120 per offence respectively, regarding only the physical and emotional impact. The authors mention that the 'less serious VAP' category (£120 per incident) denotes Other Wounding and the 'more serious VAP' category (£97,000 per incident) regards Serious Wounding. However, it was not clearly distinguished what type of offence was classified as 'all VAP excluding homicide' (£12,000 per incident). Their remarks on the classification were: "(...) *Estimates for serious*

wounding have been used for all offences in the "more serious violence against the person" category. Estimates for other wounding have been used for all offences in the "*less serious violence against the person*" category. Other offences classified as "*more serious offences*" in Criminal Statistics 1998 are assumed to have the same cost as 'serious woundings', and other offences classified as 'less serious offences' are assumed to have the same cost as 'other woundings' (Brand & Price 2000, pp. 39-41).

 Though pioneering, the methodology by Brand and Price (2000) suffers a substantial weakness. Their methodology used the values relating to road traffic accidents as calculated by the UK Department for Transport using WTP methodology (see DETR 1999) to derive at their intangible figures. Brand and Price (2000) set the intangible cost of a homicide to be the same value as a fatal road accident, the cost of a serious assault to that of a serious road accident and a more minor assault to a more minor accident. However, by simply transferring the value of preventing a fatality (VPF) used in road transport to derive at those figures, Brand and Price (2000) did not consider the possibility of differences in the degree of aversion towards being a victim of crime as opposed to a victim of a road accident (Dolan et al. 2005). As Dolan et al. (2005, p. 959) argue, "*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*". Consequently, although their estimates are considered robust it can be assumed that by adjusting for those differences, their derived figures could be even higher. This is further reinforced by the findings reported in the later workings by Dolan et al. (2005) and Dubourg, Hamed and Thorns (2005).

 Dolan et al. (2005) and Dubourg, Hamed and Thorns (2005) employed a methodology based on the use of Quality Adjusted Life Years (QALYs) to provide estimates of intangible costs of non-fatal violent crimes in terms of health loss. That is, the physical injuries and impacts on mental health associated with the consequences of violent crime translate to QALY estimates, which are in turn converted into monetary values. Dubourg, Hamed and Thorns (2005) reported an aggregated value for emotional impact of both other and serious wounding as £4,554 whereas for common assault the figure dropped to £788 per incident. Dolan et al. (2005) used evidence from the British Crime Survey on the incidence of various health impacts of crime and calculated the QALY loss coefficients for each impact. This produced estimates of the discounted QALY losses associated with each crime and these losses were then translated into money values using two different thresholds (£) per QALY. The first threshold was £30,000 per QALY, value inferred from decisions

made by National Institute for Clinical Excellence (NICE). The second was £81,000 per QALY and the value was suggested by the authors as their QALY equivalent to the losses from '*Injury W16*' as reported in Jones-Lee, Loomes and Philips (1995) and Carthy et al. (1999). Using those thresholds as a *"rate of exchange"* between QALY scores and money (Dolan et al. 2005, p. 968), they calculated the intangible costs for common assault as £218 (NICE) and £587, for other wounding as £945 (NICE) and £2,539 and for serious wounding as £5,723 (NICE) and £15,378.

 Dolan and Peasgood (2007) employed similar methodology to assess the costs of FoC, categorising those to health losses (QALYs) and non-health losses (changes in behaviour and/or in how society is viewed). Dolan and Peasgood (2007) used data from a UK survey (n=977) (Farrall & Gadd 2004) to obtain respondent's levels of fear[17], which they matched to EQ5D[18] (Brooks & EuroQol_Group 1996) scores to calculate the QALY losses associated with the FoC. Following Dolan et al. (2005) they employed two different values per QALY (£30,000 and £81,000) and estimated the monetary loss attributed to this immediate health loss from FoC to £19.50 and to £52.65 respectively per person, per year. Aggregating these values across England and Wales population, the implied annual costs were £776.5 million and £2,097.6 million. Despite the robustness of the QALY technique, the accuracy and validity of these figures can be questioned due to the assumptions involved throughout their calculation. For instance, Dolan and Peasgood (2007) assumed that the intensity of 'fearful incidents' has a certain impact on health that can be assigned to QALY loss; e.g. a 'very worried' reply assumed the related fear incident should last a specific amount of time that impacts health in forms of anxiety or depression (Jackson & Stafford 2009). They also assumed that the stated descriptions of the health states realistically reflected the fearful incidents, which could lead to overestimation. However, had their estimates tackled other costs sources such as non-health costs, costs induced by health-reducing behaviour or other psychological reactions their derived figures would be significantly inflated.

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[16] The injury labelled 'Injury W' 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 (Dolan et al. 2005).

[17] The survey asked *"In the past year have you ever felt fearful about becoming a victim of crime?", "How frequently have you felt like this in the past year?", "On the last occasion, how fearful did you feel?"* with response categories in Likert scale varying from '*not very ...*' to '*very ...*' (Dolan & Peasgood 2007, p. 126).

[18] EQ5D is detailed in Chapter 5, but briefly, it scores health according to five dimensions: mobility, self-care, usual activities, pain/discomfort and anxiety/depression with three levels for each (1 for no problems, 2 for some problems and 3 for extreme problems) (Dolan & Peasgood 2007, p. 126).

Moore (2006) analysed ESS data and by regressing measures of fear and income on happiness scores, he attempted to elicit a shadow price of fear. His findings indicated that both income and FoC were significantly associated with happiness, providing a monetary compensation for an increase in FoC equivalent to an additional income of €13,538 per household[19]. Despite the novelty in this application, Moore (2006) did not have data on fear rates but instead assumed that safety could be used as a proxy for fear[20]. Thus, the figure of €13,538 could reflect value of safety rather than fear per se. Cohen (2007, p. 28) questioned Moore's (2006) interpretation noting that the question asks "*whether or not someone feels 'safe' not whether or not they express fear*", suggesting that a person may feel unsafe but not afraid. A different interpretation implies that lack of safety could reflect avoidance rather than fear[21] and hence the estimate of €13,538 could equal the opportunity cost for living in a safer area. However, Moore's (2006) study is unique in its implementation of shadow pricing and the lack of other appropriate data sources constitutes this limitation a matter of insufficiency and not of selection.

Moore and Shepherd (2006) employed similar approach to estimate the shadow price of victimisation using FoC as a proxy for happiness. Using BSC data and thereby derived proxy measures of fear[22] (Bolling et al. 2002), crime rates and indices of multiple deprivation (Noble et al. 2000), they assessed the relationship between income and FoC to elicit a value that reflects victimisation. Assuming that greater income induces happiness and consequently reduces fear, Moore and Shepherd (2006) tried to infer the additional income required to offset victimisation while keeping the FoC constant[23].They concluded that FoC was significantly associated with income, expressions of threat and other socio-demographic characteristics but not with actual victimisation. Shadow pricing indicated that for a one-step increase in violent threats, that is a change from the status of no threat to one threat, a 496% increase in the total household income is required in terms of compensation to keep the value of fear of walking in the dark constant. Similarly, a 115% increase

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[19] In other words, the amount of €13,538 provide an approximation of the value individuals place on safety from crime, as represents the equivalent income required to preserve the individuals' level of happiness while shifting level of subjective safety.

[20] The ESS asks "*How happy are you*" and "*How safe do you -or would you- feel walking alone in your neighbourhood after dark?*" based on a Likert scale with 11 points.

[21]As by not feeling safe walking alone in a specific area the respondent could imply that they avoid the area.

[22] "*How safe do you feel walking alone in this area after dark?*" & "*How safe do you feel when you are alone in your own home at night?*"

[23] In other words, their aim was to monetise the offset of an unwanted (negative) change in life (e.g. threats, victimisation) for maintaining a constant value of fear of crime.

of the total household income was elicited as compensatory amount for moving from the status of none to one violent threat for fear of being home alone. For repeated threats (status of one to more than one), a 116% and 20% increase in the total household income was found to compensate increased fear of walking in the dark and being home alone respectively. Powdthavee (2005) found that growing crime rates seemingly weaken the impact of victimisation but on the other hand, victimisation is negatively associated with happiness (Michalos & Zumbo 2000; Powdthavee 2005; Di Tella & MacCulloch 2006) and positively associated with anxiety (Kesteren, Mayhew & Nieuwbeerta 2000; Tseloni et al. 2002).

Powdthavee (2005) analysed data from a life satisfaction study in South Africa (n=24,949) and found that it would require approximately $21,142 (in 2005 US dollar value) in additional household expenditures per month to compensate a victimisation event[24]; a figure almost 82 times the average monthly spending of a household in South Africa. Cohen (2008) used the life satisfaction approach to study the effect of crime in the US (n=12,000) and found that home burglary (being burgled) had a larger impact on life satisfaction compared to county-level crime rates and perceived neighbourhood safety. In monetary terms, the compensatory income for moving from a safe to an unsafe neighbourhood was estimated at $34,322 per year (ranging from $12,745 to $69,488 based on a 95% confidence interval) for the average household, whereas the equivalent compensatory income for home burglary was estimated at approximately $85,000 (ranging from $10,353 to $322,261 based on a 95% confidence interval).

In review, life satisfaction studies offer a valuable alternative to estimating costs of crime where non-use values are involved. Hanson et al. (2010) conducted an extensive review examining the impact of crime victimisation on quality of life indices including life satisfaction surveys and reported that a great sphere of influence. However, they noted that "*data on relationships between crime victimisation and overall life satisfaction were mixed*" (Hanson et al. 2010, p. 189) and concluded that although the life satisfaction approach can be used to improve cost of crime estimates, further investigation is required to achieve this purpose.

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[24] "[...] *to make the victim feel indifferent about the experience of crime*" (Powdthavee 2005, p. 538)

2.10 Summary

  This chapter carried out a thematic and chronological presentation of the most influential published studies to date that pertained to valuing (violent) crime following a narrative approach. The review indicated that violence is a constantly raising issue with a considerable burden on society; the costs incurred through treating victims and apprehending the perpetrators combine with economic costs, the emotional victim costs and costs to the community through increased FoC to suggest the costs of violence are significant. Regardless of their financial burden, little is known about the value that the public places on the benefits of reducing violent crime, particularly its less tangible effects, such as the pain and suffering imposed on victims. In addition, despite considerable efforts to develop interventions that reduce the rate of violence, their cost effectiveness cannot be determined as the monetary value of a violent crime is unknown. While estimates are available, there is a need for further work in the UK context to tackle the currently limited knowledge on the value that the public places on the benefits of reducing violent crime, particularly its less tangible effects such as the pain and suffering imposed on victims. Although a number of approaches have been developed to aid the calculation of aggregate costs estimates, placing a monetary value on the physical and psychological harm resulting from violent crime is far from straightforward. As Atkinson, Healey and Mourato (2005, p. 560) note "(…) *valuing crime endpoints requires examination of available medical, epidemiological, and self-report evidence and then judging which elements are needed to summarize the core-set of physical and mental health outcomes that a typical victim might be expected to suffer following a given violent assault*".

  Consequently, epidemiological research should precede any type of estimation exercise, to appreciate the extent of these endpoints. The following two chapters offer such an insight where new findings will add to those presented here to generate and ground the main hypotheses that will be further investigated in this thesis. Briefly, the pertinent points that conclude this chapter are outlined below:

- Costs of violence incur a great burden on society and the individual.
- Numerous attempts have been made to categorise violence-derived costs in an effort to produce aggregate estimations.

- There is no clear consensus in the literature regarding which typology should be adopted in determining such estimations, thus researchers each time implemented their own taxonomies for this purpose.

- Although violence and crime are familiar concepts, the idea of eliciting the cost of violent crime to society and individuals is relatively new.

- Despite the importance of both tangible and intangible costs, the available estimates regarding costs falling in the latter category are very limited, especially in the UK context.

- There is no universally accepted approach for eliciting intangible costs of crime and not all the available methodologies can be applied for this purpose.

- There is no designated body particularly assigned with the study of victims and violent crime, indicating the current gap when it comes to assessing violence derived costs.

- There is a need for developing approaches to examine crime implications to the victim and metrics that can be universally employed as an aid in the comparison of different studies.

- The stated approach appeared to be the most suitable for eliciting intangible cost estimates, counting numerous applications in the US and only one in the UK.

Chapter 3
Methodological Overview

3.1 Methodological framework

The design of this thesis was based upon the premise that initial findings will direct later investigations, thus grounding the research in evidence while allowing for flexibility. Thus, an iterative process defined the baseline of the experimental research. The research questions, concepts and methodology of the thesis were refined following a scoping review of the literature, presented in Chapter 3. Using a narrative but high-level free text search strategy, Chapter 3 documented the current state of knowledge on the costing crime literature, to appreciate how knowledge has developed over time and how different approaches compare with each other. The purpose was to identify gaps and situate this research accordingly to address these gaps through formulating aims and objectives in the specified subfield and to identify the appropriate methodology for addressing these aims and objectives. Therefore, the great gap observed in the valuation of the intangible costs of violent crime prompted this research to focus upon investigating these costs in order to provide new insights into the costs of violence resulting in physical and psychological injury. On the assumption that such costs can at least broadly be estimated, the choice becomes on the most suitable available technique (Bateman et al. 2002).

The literature review in the costing violent crime methodologies indicated the suitability of SP techniques for the context of this research, concluding that to estimate intangible costs, economic valuation is required. In terms of economic theory, one person's attitude towards an object or a 'good' determines a person's intentions to purchase it or not (Ajzen & Fishbein 1980). However, people typically amend their initial interest in that 'good' over time, adjusting their preferences and attitudes to balance their current needs. Hence, such "decision-making" process is not always precise nor strictly defined (Ready, Whitehead & Blomquist 1995; Wang 1997; Dubourg, Jones-Lee & Loomes 1997). The tendency to respond to an object or a situation in a particular way is learned, implying that attitudes are affected by different factors that cause the learning to take place prior to

the formation of attitudes. Ajzen and Fishbein (1980) suggested that acquiring favourable or unfavourable attitudes against objects, and in extent situations, is not an intuitive trait but a learned skill. This can also apply to the health context, as attitudes can be defined as a learned predisposition to respond in a consistently favourable or unfavourable manner regarding a number of elements or conditions. In the context of this research, such a favourable or unfavourable manner translates to whether a person finds the described change in his/her health status "worthy" of monetary investment.

The choice of CVM for the estimation of such costs was grounded on three main reasons: (i) the fact that WTP for victimisation risk reduction is regarded as a "non-use" value (NUV) given that the impact being valued has no actual substitutes (respondent cannot be given an alternative that equals victimisation)[25], (ii) stated preference technique does not impose any limitations on the context that it can be applied to, and (ii) the evidence provided by the literature on the suitability of the stated preference methodology for such a purpose.

However, the design and development of a CV survey is a complex and difficult exercise. Given that in any study most validity issues need to be considered from the earliest stage possible, the developmental phases of this research were of utter importance. For this reason, the course of work was meticulously organised following specific steps to ease this process while ensuring that, when possible, all criteria for validity were being satisfied. A number of issues were considered before commissioning the study as limitations regarding the available time, resources and costs had to be imposed due to the nature of the research. Compromises had to be made for the study to be feasible but without lacking integrity. According to Bateman et al. (2002, p. 68) "*The credibility of an economic valuation study depends on (i) the intrinsic merits of the technique chosen, (ii) the scientific and physical data and (iii) the quality of the study itself*". In the same vein, from the first to the last stage of this project, the research procedures followed guidelines cited in established works and a number of quality criteria were considered for a sound evaluation of the project's survey instrument (see e.g. Mitchell & Carson 1989; Oppenheim 1992). These were organised into three sections corresponding to the three principal characteristics of any well-designed instrument: (1) Design, (2) Technical Quality, and (3) Utility.

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[25] NUVs can only be detected by stated preference techniques (Bateman et al. 2002).

3.2 Design: Item Construction

In order to address the particular aims of the research it was necessary to design an appropriate research instrument that would not only describe efficiently the 'good' under valuation but would also capture the features of victimisation that influence the victim's emotional response, and by extent, the costs associated with those. For this to be achieved, the instrument should include a number of items on socio-demographic and other characteristics relevant to the aims of the research to describe the sample, to examine similarities or patterns in responses grouped based on these characteristics and to assess their impact on the elicited values (Arrow et al. 1993; Bateman et al. 2002).

The battery work (see Chapter 5) demonstrated the essentiality of providing a brief preview of the concept of the survey before its completion. Two were the main reasons for this choice: to provide the respondents with simple instructions and information on the subject of the study and to reduce the amount of 'protesting' due to possible misunderstanding of the nature of this survey. The battery work identified the difficulty respondents met in comprehending the reasons the survey asked them "*how much they would pay*". On some occasions, people protested saying that they pay enough taxes already or that they did not agree with the concept of the "willingness to pay". This type of protesting is typically found in WTP studies and there is no universal solution to prevent that other than briefing the respondent the best way possible. Hence, the purpose of the covering letter was to provide the respondent with simple but necessary information to complete the CV section in an effort to reduce the protests. This was reinforced by the think-aloud sessions that took place after the insertion of the introductory paragraph as the focus shifted from the CV section to other less important issues such as the format and layout of the questionnaire. This shift of focus indicated that the respondent had a good idea of the concept of the study before starting answering the questions.

3.2.1 Development of the non-valuation section

The non-valuation part of the questionnaire comprised a series of questions on respondents' characteristics including attitudes, debriefing questions and demographic information. To identify

those characteristics that reflected the focus of this research and gain an in-depth perspective in the background of the valuation problem that would aid the selection of appropriate background questions, secondary data analysis was carried out with the 08/09 British Crime Survey dataset. The selection pertained to availability and suitability in terms of context and information richness. The study identified specific victimisation predictors and showed that victim's emotional reaction varied in severity based on the physical characteristics of the assault with the severity of the physical trauma being a predictor of predicted greater emotional distress. Based on the importance of specific features in the study of victimisation, it was assumed that these characteristics would influence the intangible costs. Thus, they formed the scheme for the selection of the non-valuation questions, which were accordingly placed in distinct theme-sections in the survey instrument. These themes encompassed socio-demographic characteristics (gender, age, ethnicity), quality of life indicators (self-rated health, income, marital status, educational qualifications) and offence-specific characteristics (use of force/violence, sustained injuries, injury severity, severity of the emotional effect, alcohol consumption prior to the incident).

All questions used in this part of the survey instrument were adopted from previously validated questionnaires, including the BCS 08/09, the International Crime Victim Survey[26] (ICVS-5) 2004/05 (van Dijk, van Kesteren & Smit 2007; Van Kesteren 2007) and the ESS. Two validated screening instruments were also incorporated to the current instrument (M-SASQ) was used as a screening tool for describing the alcohol consumption and the EQ-5D-5L as a health measure (EuroQolGroup 1990).

The victimisation module aimed at eliciting information from the respondents regarding their previous experience with violence that would be subsequently used to examine how specific victimisation elements influence stated valuations. A certain structure was applied to the questioning mode to reduce the overall response time for those that certain questions were not applicable. Questions 18 and 19 asked whether respondent had been threatened with violence and assaulted respectively. Only those confirming an assault continued with the victimisation module while the rest were prompted to answer Question 20 on indirect victimisation.

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[26] The ICVS is a programme of standardised sample surveys to look a householders' experience with crime, policing, crime prevention and feelings of unsafety in a large number of countries including non EU (see http://rechten.uvt.nl/icvs/ for details).

Question 18 regarding threatening was replicated from the ICVS-5: 2004/05 (Van Kesteren 2007). The element of non-domestic experience was added as the respondents where prompted to answer bearing in mind all possible places excluding their home. The reason for this amendment was that the survey did not want to implicate domestic factors on the evaluation of the results, as it would add complexity to the later investigations while it would require additional ethical reviews. Similarly, Question 19 asked whether the respondent had ever been assaulted, without requiring details on the type of the assault. Only those answering "Yes" in Question 19 were eligible for the remainder of the victimisation module. Similarly, Questions 19.5-19.7 were only made available to those that had sustained some type of injury during the assault. The wording in Questions 19.1-19.6 was adopted from the BCS 2008/09 without maintaining though the same response options, as the BCS offers more details than the current survey required. Questions 19.7-21 were replicated from the ICVS-5: 2004/05 (Van Kesteren 2007).

Next, respondents were asked on their spending on leisure activities per week, in an effort to obtain a supplementary measure of respondents' uncommitted income (Q22). A screening question followed on alcohol consumption (Q23) and if respondents did not qualify, they were prompted to continue with Question 27. The "Modified Single Alcohol Screening Question" (M-SASQ) was used as a screening tool for describing the alcohol consumption (Q26) and the remaining alcohol related questions (Q23-Q25) were developed for the survey. The battery work did not identify any intelligibility issues pertaining to these questions.

Demographics and health indicators were asked last and comprised Questions 29-34, which were adopted from the BCS 08/09 with minor amendments to suit the needs of the current survey (e.g. instead of a full date of birth only the year of birth was asked). Only Question 28 was replicated from the ESS (ESS Main Questionnaire, C1 CARD 18, p.15) as an alternative measure of self-rated health (also see §3.2.6 and Appendix 2, §2.3-4 for the text of the survey). The EQ-5D-5L was used as a generic health measure as it provides a simple descriptive profile and a single index value for health status (Q35.1-6; see Appendix 2, §2.3-4)[27]. A standardised measure of health status was

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[27] The EQ-5D-5L and comprises two pages: the EQ-5D descriptive system (page 1) and the EQ visual analogue scale (EQ VAS) (page 2). The EQ-5D descriptive system comprises five dimensions; i.e. mobility, self-care, usual activities, pain/discomfort and anxiety/depression, with five levels each (e.g. *I have no pain or discomfort$_{(1)}$, I have slight pain or discomfort$_{(2)}$, I have moderate pain or discomfort$_{(3)}$, I have severe pain or discomfort$_{(4)}$, I have extreme pain or discomfort$_{(5)}$*). The respondent is asked to indicate his/her health state by selecting the most appropriate statement in each of these dimensions. The

preferred over a non-standardised question as used in BCS, ICVS-5: 2004/05 and ESS[28] to ensure the quality of the obtained responses and substantiate their validity. Permission for using this tool was granted in May 2011 by the EuroQol Executive Office.

3.2.2 Development of the valuation section

The survey aimed at producing an estimation of how potential victims value victimisation risks and at assessing the influence of seemingly extraneous factors on the stated values, such as alcohol consumption, risk taking and previous victimisation experience (direct and indirect). As soon as these factors were clarified and added as questions in the non-valuation part of the instrument, the next step was the construction of the valuation scenarios. The purpose of the valuation section was to determine the monetary equivalent of the intangible effect of victimisation on well-being based on the values public placed on a series of victimisation risk reductions. In addition, a separate valuation scenario describing a victimisation prevention programme was added, asking respondents' vote and WTP on its implementation. Following Carson, Flores and Meade (2001), the structure of the valuation section comprised (1) an introductory section outlining the valuation context, (2) a description of the change in the attributes of what was being valued, (3) the valuation questions and (4) debriefing/feedback questions on the stated responses.

3.2.2.1 Scenarios and harm descriptors (Q1-Q11)

Scenarios derived from secondary findings from analysing the British Crime Survey 2008-09 and A&E data, both rich data sources for studying violence, as they produced a baseline for describing the 'good' that would be valued. The BCS analysis identified specific victimisation predictors and showed that victim's emotional reaction varied in severity based on the physical characteristics of the assault, with the severity of the physical trauma being a predictor of greater emotional distress. The A&E study further substantiated this indicating that the severity of the physical trauma not only corresponded well with that of the psychological trauma but could also be reflected from a categorisation of injuries by anatomical site. Preliminary analysis examined the characteristics of injury focusing on patients registered as victims of assault and identified that head injuries (fist

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EQ VAS records respondents' self-rated health on a vertical, visual analogue scale where the endpoints are labelled '*Best imaginable health state*' and '*Worst imaginable health state*' and provides a quantitative measure of health outcome as judged by the respondent.
[28] E.g. "*How is your health in general?*" with 5-likert scale responses from '*very good*' to '*very bad*'

inflicted) were most prevalent in victims of assault. The injuries were then sorted based on their anatomical location to head, body and torso and the categorisation was tested against three severity measures. This was done to assess how the corresponding injuries assigned to those locations corresponded to the previously identified two-dimensional severity structure of emotional responding. The results supported the severity-based classification of the injury descriptors resulting from violent victimisation and two levels of severity emerged, minor injury and severe injury. For each physical location, the most prevalent injuries were selected and these comprised the physical injury descriptors that were used in the valuation scenarios. After consulting with Dr Simon Moore and Dr Vaseekaran Sivarajasingam, both experts on injuries sustained by victims of physical assault, the following injury descriptors were constructed:

Head & Face: *minor injuries* (e.g. slight scratching, bruising, black eye and other superficial injuries) potentially noticeable that would not require medical attention or prevent the victim from daily activities - *severe injuries* (e.g. broken nose, concussion, internal injuries) that would require medical care and/or hospitalisation.

Torso (abdominal area): *minor injuries* (e.g. lacerations, cuts, bites, abrasions, soft tissue injury/wounds, bruising, other superficial injuries) potentially painful and/or noticeable that would not require medical attention or prevent the victim from normal activities - severe injuries (e.g. broken bones, internal injuries) that would necessitate medical care and/or hospitalisation.

Limbs (arms & legs): *minor injuries* (e.g. lacerations, cuts, bites, bruising, other superficial injuries) potentially painful and/or noticeable that would not need medical attention or prevent from usual activities - *serious injuries* (e.g. fracture, compound fracture, dislocations) that would necessitate medical care and/or hospitalisation.

As a point of reference for this classification, Kershaw et al. (2000) classified the BCS offence categories according to severity of injury in three levels: 'Common Assault', 'Other Wounding' and 'Serious Wounding'. The description for the inflicted injuries in these categories was trivial or negligible injury for the first, moderate but not serious wounding (e.g. substantial bruising, cuts, etc.) for the second and serious wounding with risk of permanent injury or damage that may also require

immediate medical attention for the third[29]. Although the degree of violence differs considerably between incidents falling in the same offence category, the BCS estimates on the overall violence[30] indicate that 52% of all the BCS recorded incidents and 47% of all police recorded violence against the person resulted in injury to the victim (Kershaw et al. 2000). The 2008/09 BCS estimates[31] indicated that 53% (n=1,116,000) of the recorded assaults against adults involved violence with wounding (serious injuries; n≈466,000) and minor injuries (n≈533,000), while 40% (n≈844,000) did not involve physical injury (Walker et al. 2009). However, such an injury-based classification neglects the importance of the inflicted psychological trauma and may assign equivalent importance to minor and more serious injuries by failing to consider victim's pain and suffering. Therefore, a universal assessment of the outcome of violent victimisation requires the inclusion of psychological injury descriptors to capture the intangible aspects of such an event.

The secondary findings from Chapter 4 indicated that two levels of severity underlie the severity of the inflicted emotional stress, severe and moderate. Two different techniques were used for studying the emotional aftermath of victimisation and both analysed the same set of psyche injuries measured by the BCS. Although both analyses suggested a two-dimensional structure reflecting severity, the elements defining each dimension varied and occasionally overlapped. The descriptors for moderate emotional distress levels in one approach were shock, fear and loss of confidence/feeling (with some influence attributed to anger, difficulty sleeping and crying/tears), whereas the other indicated anger, shock and annoyance as the most suitable descriptors for the same level of emotional distress. Similar phenomenon was observed with the descriptors of severe emotional distress where the descriptors under one approach were depression, anxiety/panic attacks, crying/tears, difficulty sleeping, loss of confidence/feeling vulnerable, whereas for the other these also included fear and shock. This overlap led to a different interpretation for these findings.

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[29] (i) COMMON ASSAULT (BCS code 13): '*Injury inflicted trivial or negligible*', (ii) OTHER WOUNDING (BCS code 12): '*Injury inflicted i.e., substantial bruising, cuts, etc, but not amounting to a serious wound*' and (iii) SERIOUS WOUNDING (BCS code 11). Either: (a) '*Offender intended to inflict really serious wound*' or (b) '*A really serious wound was inflicted and therefore risk of permanent injury or damage*' (medical attention needed immediately for (b)).
[30] All violence includes wounding, assault with minor injury, assault without injury and robbery.
[31] Continuing a similar pattern to previous years, assault without injury accounted for the largest proportion (40%) of all violent incidents measured by the BCS in 2008/09, followed by assault with minor injury (25%), wounding (22%), and robbery (13%) (Table 3.01 in Walker et al. 2009).

Notably, the contribution of the underlying items in both approaches pointed towards a similar, severity based portrayal of expected emotional distress based on the implied psychological impact. However, both types of analyses were indicative and not conclusive, thus an alternative item representation could be observed in each dimension. Thus, a different interpretation was adopted, were the focus was placed on the individual items and their implications on the resulting structure.

In both approaches, only the items underlying severe level of emotional reaction could reflect symptoms diagnosable in the two disorders prevalent in victims of assault (PTSD and ASD; also see Chapter 4). Although the observed symptoms overlap in both, the difference in the diagnosable outcome lies in the how pervasive these are in terms of their duration and the interference they impose on the individuals' life. The severity of each disorder is primarily assessed on duration with PTSD being considered more severe due to its chronic nature (min. 1 month; see Chapter 4). For this reason, the specification of a very specific array of symptoms with no reference to their duration would not be representative of the psychological trauma as it would mediate the significance of the individual items by assigning equal weights to outcomes with varied impact, severity and duration (e.g. depression, panic attacks and tears would be in the severe harm descriptors). Such an inconsistency would also undermine the validity of the outcome profiles as it could be a source of bias to the stated valuations, especially for the moderate psychological income, which would only refer to items such as annoyance and anger. In addition, if the emotional dimensions were to be described based on symptoms or specific type of emotions, a valid, severity based classification would necessitate the full range of symptoms to be outlined and accounted for in the outcome descriptors.

For these reasons, this research adopted two of the duration based injury descriptors that were employed in the study by Atkinson, Healey and Mourato (2005) that not only corresponded to the severity based structure reported here but were also validated by subject matter experts regarding their context representativeness. Despite the differences in their valuation scenarios, they also combined elements of physical and psychological distress to describe the consequences of violent crime on the welfare of the victims. Specifically for the emotional outcome, their injury profiles were based on the severity implied by the duration of symptoms such as recollections of assault, nervousness, sleeping and concentration difficulties (Atkinson, Healey & Mourato 2005).

Altogether, the findings from these analyses coupled with published evidence were translated to six scenarios that described the expected inflicted trauma on victims in terms of both physical and psychological effect distinguished by severity (moderate and serious) and anatomical location (head, torso, limbs) under the assumption that features would be pivotal in monetising intangible victim's costs. These were: moderate head injuries with medium-term emotional distress (Scenario A), severe head injuries with long-term emotional distress (Scenario B), moderate torso injuries with medium-term emotional distress (Scenario C), severe head injuries with long-term emotional distress (Scenario D), moderate limb injuries with medium-term emotional distress (Scenario E) and severe limbs injuries with long-term emotional distress (Scenario F). For each of these scenarios respondents were asked to state how much they would be willing to pay to avoid the described (undesirable) event and how much they would ask for as compensation to accept that event. The structure of the scenarios followed that described in Atkinson, Healey and Mourato (2005) for two reasons. Fist because it was the only UK based CV application to the crime context, and second, because their elicitation was primarily focused on the intangible rather than the tangible aspect of violent crime. However, their study differed significantly not only in terms of questioning format (they did not involve physical injury at all times) but also in terms of study design (mode of data collection, survey administration, sampling technique etc.).

After the harm indicators were finalised, two issues had to be addressed for the scenarios to be completed; i.e. what percentages of risk reduction would be specified throughout the valuation section and whether a certain baseline risk should be provided. Regarding the risk reductions, the pretesting stages pointed towards employing a series of percentages throughout this investigation (10%, 50% and 100%). Although studies typically employ one percentage when describing specific reduction[32], three were the main reasons for this choice. First, to assess the difference in the stated valuations as this has not yet been addressed in the literature. Second, to help respondents in their valuation by providing a point of reference as people are expected to more easily value a greater risk reduction. Although so high risk reductions may seem unrealistic, the hypothetical nature of the CV

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[32] Cook and Ludwig (2000) asked respondents to vote and place a value on a prevention programme to reduce non-fatal incidents of gun-related violence in the US by 30%. Cohen (2004) employed a 10% reduction asking respondents to value the benefits of US public programmes to reduce criminal offending associated with burglary, serious assaults, armed robbery, rape or sexual assault, and murder. Atkinson, Healey and Mourato (2005) asked respondents to express their WTP to reduce their chance of being a victim of a certain offence by 50% over the next 12 months, providing descriptions of the physical and mental health impacts of that specific type of offence.

methodology allows a relative flexibility in the questions asked given that WTP estimates have not yet been proven sensitive to the amount of the reduction offered to respondents (Atkinson, Healey & Mourato 2005). Third, the 10% and 50% risk reduction offer the study a measure for the internal consistency of the valuations as (if multiplied by 10 and 2 respectively) they can provide an approximation for the responses on the complete avoidance asked later on. Nonetheless, the valuation questions should be viewed as means of deriving relative values rather than actual values per se, thus alleviating some of the concerns about the validity of the estimated results (Sorum 1999).

Regarding the baseline risk, after consulting with the supervisors of this thesis and considering the evidence in the literature (see e.g. Ludwig & Cook 2001; Cohen et al. 2004), it was decided to ask respondents to value the specified percentage reduction in risk without specifying any baseline to describe those. Although such an approach challenged the NOAA panel recommendations (Arrow et al. 1993) and could be regarded as a factor undermining the quality of the definition of the 'good' being valued, three reasons justified this choice.

First, these recommendations mostly apply to environmental studies where the focus is the evaluation of interventions designed to alleviate environmental harm. The intention of this research was not to inform or be embedded specific policies but to gain an appreciation of how respondents appreciate and accordingly value their own risks. Second reason was to avoid any type of bias incurred by a pre-specified baseline. Such a specification could be a source of bias, as the only eligible option would be to provide respondents with a full record of the risks and consequences of victimisation. If baseline was to be offered, it needed to be tailored to reflect the exact risks involved in the offered scenarios. In this case, such a task could not be implemented due to the lack of available information to construct suitable indicators for the risk assessment. Thus, any effort to construct baseline risks would not be fruitful as it would most probably inflate or undermine the actual risks involved. Furthermore, the inclusion of baseline risks would not only add to the complexity of the valuation exercise but would also lengthen the scenario description and probably shift the focus from what the scenarios were describing to the baseline risks under each scenario.

Third, there was no clearly articulated consensus in the literature suggesting otherwise or establishing that baseline risk specification improves or impairs the stated valuations. Although it

can be argued that by providing a baseline respondents become more knowledgeable to make an informed decision, that information largely depends on what they already know and "*while it is a desirable goal to minimise divergence between the stated survey scenario and what respondents believe, there will always be some divergences*" (Carson & Hanemann 2005, p. 900). Along the same line, Carson and Hanemann (2005) note that although prior experience with a good is an advantage for a valuation exercise it is not necessary condition for CV to work as it "(…) *neither follows from economic theory nor accords with people acting as rational agents purchasing unfamiliar goods or voting on new political candidates* (Carson & Hanemann 2005, p.899). The provision of additional information could be detrimental given that substantial differences were expected between the conditions described in the scenarios and the respondents' state when answering the survey. The questions asked in the non-valuation part of the questionnaire aimed at assessing the extent of the difference in these conditions attributable to individual experiences. Thus, although it can be argued that by not specifying baseline risks, the risk reduction levels cannot be compared across outcome, this would be an issue in valuation of specific policies that need to outline baseline risks as these are involved in later assessments. However, this was out of the scope of this research where the interest was the costs as perceived and valued by the respondents.

Considering the above, such a choice was not considered to particularly impair the estimated values. Although the survey did not describe a specific baseline for the offered 'good', the situation described in the scenarios assumed that the baseline for that good would be the current wellbeing of the respondent[33]. Based on how respondents perceived their wellbeing and their victimisation risks they would value that good accordingly. Since there was no expressions of concern regarding the omission of baseline risks emerged the development process of the harm descriptors, there was not enough evidence to support the added value such an inclusion would have to the final instrument. This view was reinforced by the pretesting procedures as no confusions regarding this were expressed. Nonetheless, this should be considered if the elicited values were to be used in consultations, in informing policies or as point of reference for cost analyses exercises. Furthermore, the lack of a clearly specified baseline risk suggest that it is not necessary for the ranking of the

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[33] In this context, the word 'good' describes what is being valued and does not necessarily reflect an actual wellbeing situation.

outcomes and rank ordering of WTP to avoid to agree as they clearly depend on the perceived baseline risk.

Another emerging point from the harm indicators was the exclusion of life threatening outcomes. The design of the research was explicitly based on experimental research which did not include the study of such outcomes. Thus, there was not enough evidence to support the inclusion of these outcomes in the valuation scenarios. Such an inclusion would not only add to the complexity of the valuation task for the respondents but would also complicate the process of interpretation as a concrete and honest representation would not be feasible. Instead, the more severe harm indicators described outcomes serious enough to cause major and/or consistent discomfort, malaise and abstention from or disruption in usual activities until health was restored. Similar were the reasons for not including specific indicators for sexual and domestic violence. The sources that were primarily used for constructing the questionnaire did not focus on any of those violence denominators, hence the inclusion for studying those could not be justified.

The second part of the valuation section described a new scenario in which a prevention programme would be introduced to the respondents' community and asked for respondents' preferences. Drawing from the battery work which demonstrated that all 'protesting' respondents quoted *'bad policing'* as the reason for protesting, a question on respondent's opinion on the effectiveness of policing preceded the valuation section of this scenario (Q12). That way respondent were given the option to state their objection prior to any valuations in an attempt to reduce the amount of protests attributed to the respondents' objection to policing[34]. The wording of the prevention programme questions followed previously acclaimed CV studies (Cohen, Rust & Steen 2002; Cohen et al. 2004) and the scenario description did not define specific crimes[35] but mentioned the types of crime that would not be targeted (domestic and sexual). As previously and following Cohen et al (2004, p.93) "*no information on the prevalence, risk of victimisation, average tangible losses or severity of injuries normally associated with the violent offenses*" was provided as the interest lied in eliciting WTP values "[…] *based on actual levels of concern and not on what people might pay if they fully understood the risks and consequences of victimisation*" (Cohen et al. 2004, p.93). Since the survey did not involve a specific

[34] Zarkin, Cates and Bala (2000) used similar methodology by asking whether respondents find drug abuse treatment programmes effective before asking them to state their WTP. In the context of this survey, this would translate to policing, as it incorporates the meaning of prevention programmes such as the one described in the proposed scenario.
[35] See e.g. Cohen et al. (2004).

(crime control) policy, such information was not deemed prerequisite as it would be a potential source of bias for those respondents that did not rely on their own perceptions but stated inflated values that overestimate how they conceptualise the risks involved in reality.

Question 14 examined whether respondents vote would change if the concept of compensation were introduced to the prevention programme to assess their perception on victim compensation, especially with those who initially objected the implementation of the programme. If they were affirmative, it would imply the compensation factor alone was enough to make them change their minds, hence highlighting how the perception of a possible gain interferes with the perception of victimisation risks. The final question (Q15) related to this scenario was asking respondents to state their WTP on the implementation of the described programme. To maintain consistency, similar risk reduction percentages were used (10% and 50%) omitting though that of a complete prevention, as it would not be of any particular value. Asking for both monthly and annual payments would provide another measure of internal consistency and although monthly terms are more easily conceptualised by the respondents (most of the typical tasks are done in monthly terms, e.g. wages, bills etc) the annual payments reflect reality better. The provision point mechanism was employed in this question to control for the 'free-rider problem' where a respondent may not reveal his/her true WTP for the offered 'good', hoping to benefit from others who are actually willing to pay for it (see Chapter 1).

3.2.2.2 Questions on ranking, out-of-pocket losses and compensation

Aside the WTP questions, respondents were also asked to provide their WTA for each of the scenarios with the only exception that of the victimisation programme where WTA was not of a particular value as it did not address the individual. The remainder of the valuation questions concerned the ranking of the scenarios by preference (Q7), the tangible expenditures these would incur (Q8) and the amount that would compensate the victim if that was different from the respondent (Q9).

The purpose for these questions was to provide an additional check of internal consistency in relation to the previously stated valuations (higher WTP values should correspond to scenarios being ranked at the first places). In addition to that, the questions on expenditures and compensation could also provide a mean for comparing the stated values with the individual WTP/WTA amounts

and for checking their consistency across the victimisation profiles. Specifically, Question 8 would provide an estimate of hypothetical 'out of pocket losses' paid for coping with the consequences of the described scenarios, while Question 9 was designed as an alternative WTA type of value that did not directly involve the WTA notion as it did not address the individual's need but his opinion on what a "fair" compensatory amount would be.

The rationale behind these questions was that their numerical difference could provide an alternative estimation for the underlying emotional costs since the first (Q8) did not directly involve the emotional costs but was focused on the tangible expenditures, whereas the notion of compensation (Q9) by definition encompasses psychological distress. As a follow up, respondents were asked through to explain their motivation for these valuations through an open-ended question (Q10) while also being given multiple choice options.

The valuation section concluded with two more debriefing questions developed by Schkade and Payne (1994) as a type of 'self-assessment' tool (Q16-Q17) to assess how the valuation section was perceived by the respondents and the validity of the elicited values. Ideally, these questions should follow each valuation; however, this could not be applied in this case as it drastically lengthened the survey instrument and the completion time.

3.2.3 Elicitation format

In this instrument, the elicitation questions followed each valuation scenario asking respondents to determine how much they would value the described 'good' to obtain it (WTA) and to avoid it (WTP). The elicitation format plays a crucial role in the design of a CV survey not only because they differentiate in their properties but also because different elicitation formats result in different WTP estimates even for the same 'good' in question (Bateman et al. 2002). Such questions can be posed in a plethora of ways but two principal modes of questioning generally apply: open-ended and closed-ended.

The open-ended approach directly captures the respondents' maximum WTP, but respondents may find such questions difficult to answer (Mitchell & Carson 1989). Advantages of the open-ended (OE) format are that it does not introduce range or starting-point biases and it can be highly

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statistically efficient compared to other formats. Another virtue of the OE is that is requires relatively straightforward statistical techniques and can be used in any survey mode.

However, researchers have questioned the validity of this format for a number of reasons. Firstly, such a format may place a heavy cognitive demand on respondents. Furthermore, asking for WTP in monetary terms using an OE format requires using an unbounded response scale (starting at zero but with no defined upper end) that naturally contributes to the highly variable and skewed responses typically seen with OE WTP elicitations (Kahneman, Ritov & Schkade 1999). Furthermore, people may be more likely to give "strategic" values with an unbounded scale; a respondent may believe that the treatment has high intrinsic or social value and thus places a very high value not grounded in the reality of actually paying such a figure in the form of taxes or as an out-of-pocket expense (Arrow et al. 1993). Conversely, a respondent may give an artificially low response or protest with a zero/ non-response (phenomenon labelled as "nay-saying") in an attempt to influence the actual price eventually charged or to express disbelief that the good can actually be provided. Hence, in this format responses are typically prone to a high number of non-responses or zero values and heavily skewed toward high values (O'Brien & Gafni 1996; Donaldson, Thomas & Torgerson 1997). In response to these concerns, the U.S. Federal panel argued "*both experience and logic suggest that responses to open-ended questions will be erratic and biased*" (Arrow et al. 1993, p. 4613). However, the problems occurring in the OE posed questions are frequently met in the closed-ended formats as well, especially the "nay-saying" as it is equally likely to characterise a larger fraction of the respondents regardless of the way the question is posed.

The close-ended formats ask respondents to say yes or no to a series of questions or to select a value from a pre-specified list. Closed ended questions can be met in forms of single-bounded dichotomous choice (referendum methods; see Carson, Flores & Meade 2001), one and half bound dichotomous choice (Hanemann, Loomis & Kanninen 1991; Cooper, Hanemann & Signorello 2002), double-bounded dichotomous choice (Hanemann, Loomis & Kanninen 1991; Cooper, Hanemann & Signorello 2002), payment cards (or ladder approaches) or bidding games (used in experimental auctions). However, as with the OE format, these also have methodological issues.

The bidding game is prone to "starting point bias" (also known as anchoring) where WTP changes depending on the starting value used to begin the bidding. Another problem associated with the

bidding game is the large number of outliers (a problem also found with the direct OE elicitation) which has been termed as "yea-saying" to justify the unrealistically large bid stated by the respondents. This describes the situation where respondents have a tendency to agree with the amount presented not because they believe in their stated bid but because they feel that any other option is not socially acceptable (Bateman et al. 2002; Yeung et al. 2006).

Payment cards provide the respondent with a series of amounts in monetary terms and ask him/her to choose the amount that corresponds to his/her maximum WTP for the good in question. This technique is more easily understood by respondents compared to the OE format; but is also prone to the previously mentioned "yea-saying". Other similar ladder approaches are facilitating the valuation task by offering visual aids, but at the same time are prone to "range bias", which refers to the situation where the WTP changes depending on the range of values presented (Klose 1999; Smith 2000; Venkatachalam 2004; Whynes, Wolstenholme & Frew 2004; Damschroder et al. 2007). Another shortcoming with this elicitation format is that it cannot be used with all survey modes.

The dichotomous choice (DC) format, depending on the selection of the WTP interval, provides lower or/and upper bounds on the respondent's maximum WTP. The NOAA panel (Arrow et al. 1993) endorsed these techniques because it was deemed that respondents would find these questions easier to answer as they are similar to "buy/no buy" decisions consumers make when shopping. Nonetheless, a plethora of drawbacks is associated with the DC formats, such as the limited amount of information they provide to the researcher and the complex analytical strategy they entail to compensate for this issue. That is, instead of a specific WTP amount, DC techniques provide a numerical interval which (1) adds to analytical complexity per se, (2) dictates the need of larger sample hence adding to the survey expenditures and (3) calls for stronger statistical assumptions hence making the results more sensitive to those assumptions made. Finally, anchoring and yeah-saying biases can also occur[36].

A number of variants other than the described elicitation formats have been suggested in the literature, such as the one and a half bound approach and the randomised card sorting procedure.

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[36] A double bounded choice format was derived to increase statistical efficiency. However, even responses from people who report a high level of certainty about their willingness to pay exhibit significant anomalies that increase as uncertainty increases (Watson & Ryan 2006).

However, further research is required before they become established in the field of economic valuation with stated preference techniques (Bateman et al. 2002). Determining which approach was more appropriate in the context of this research was in essence the result of an elimination process.

The OE approach was deemed the best fit for a number of reasons. First, due to the flexibility it offers. Second, given that the study's main interest lies in the approximation of an exact value the DC techniques were abandoned, as they would produce intervals of WTP rather than specific values. Third, the employment of DC format would not facilitate any comparisons among the elicited values. Fourth, the complexity of analytic strategy required by the other elicitation techniques would hinder the feasibility of this project. Finally, given that the other options would be more costly in terms of money and time while also not easily administered in any type of survey, they were not deemed as a practical option.

Despite its limitations, some researchers do not agree with the call to abandon the OE format (Smith 2000). In addition, an increasing number of empirical studies revealed that values obtained from alternative elicitation formats were significantly and substantially larger than those resulting from comparable OE questions (Bateman et al. 2002). OE format is worthy of further exploration, mainly because regardless of the available different formats, it is not yet clear which format is superior (Venkatachalam 2004). Whynes, Frew and Wolstenholme (2005, p. 384) compared alternate elicitation formats and concluded "... *it would seem that the most informative elicitation format in the present context ... appear[s] to be the open-ended format ... [though this] format is nowadays distinctly unfashionable in health economics, having long since given way to supposedly-superior elicitation formats*".

One of the drawbacks in the description of the 'good' concerned the mode of payment with respect to the vehicle and the duration of the benefit. Regarding the first, if a payment vehicle were provided, it should be both plausible and coercive. The pretesting trials tested a number of payment vehicles typically used in the literature but were unable to conclude with one that met both criteria for every respondent without incurring biased reposes. What emerged from the trials was that the focus of the respondent was shifted from the scenario description to the payment vehicle; for example, if respondents opposed to a tax raise or did not believe that the risk reduction could be delivered with certainty with a reduction programme they discounted their WTP values or protested with no response. For these reasons, no payment vehicle was specified.

Another aspect of payment concerned the duration of the benefit regarding the WTP payments; i.e. whether it would be a one time lump sum or recurrent payment. Considering the description of the scenarios, only a type of "capital investment" could plausibly approximate the benefits incurred by the payment rather than asking for payments on a continuous basis for the benefit not to disappear. To avoid confusion and confounding or bias attributable to explaining such a recurring nature of the payment, a lump sum payment mechanism was employed where the question specified that a one-off (one-time) payment was required. No issues emerged regarding this in the pretesting procedures

It should be noted here that only the question concluding the valuation section (Q11) specified a time interval (without including though any information on the type and severity of resulting harm). It was assumed that if respondents reached that stage they would have been familiarised with the potential consequences any of the scenarios would involve and hence provide more informed responses. The value of this question lied in the fact that the responses would be an estimation of how much any incident involving violence was generally worth to the respondents, constituting the specific question of major importance and providing an alternative upper bound for the remainder of the related responses.

3.3 Quality assurance: Validation Issues

The quality assurance of the developed instrument relied on a systematic process of pilot testing. Although validation of data collection instruments is a necessary step in research, emphasised in research manuals (Seliger & Shohamy 1989; Hatch & Laza

The quality assurance of the developed instrument relied on a systematic process of pilot testing. Although validation of data collection instruments is a necessary step in research, emphasised in research manuals (Seliger & Shohamy 1989; Hatch & Lazaraton 1991; MacNealy 1998; Gall, Borg & Gall 2002), there is little detailed and practical guidance on how validation should be conducted. As Converse and Presser (1986, p. 52) point out when discussing the issue of pre-testing questionnaires, *"[t]here are no general principles of good pre-testing, no systematisation of practice, no consensus about expectation;*

and we rarely leave records for each other". Alderson and Banerjee (2001; 2002) corroborate this, highlighting the limited number of studies reporting validation data.

The absence of relevant information constitutes a great obstacle when it comes to infer commonly accepted practices and standards in the field. For this reason, the decisions made in this process were based on the available literature, especially those concerning the choice of methods and general principles, and largely on the author's sense of plausibility regarding those dealing with practical constraints. Given that testing the instrument with a single format of pre-testing would not be sufficient, a consecutive series of pretesting procedures was employed to tackle the lack of additional quantitative measures available for such validation. Following the recommendation by Alderson and Banerjee (2001; 2002) and by Bateman et al. (2002) a variety of triangulation techniques with a mixture of qualitative and quantitative elements (one-to-one interviews, focus groups, field pilots, think-aloud sessions etc.) were employed for the questionnaire validation. The battery work was carried out in four stages and after each stage, the outcomes were scrutinised altogether to correct the emerging issues (see Figure 3:1).

First pretesting stage
- 2 hard copy surveys with briefing interviews (n_{tot}=40)
- 2 focus groups (n_{tot}=14)
- Cardiff university students (Convinience sampling)

Fourth pretesting stage
- Web-based survey (n_{tot}=64)
- Cardiff residents (Convinience sampling)

Second pretesting stage
- 1:1 interviews (n_{tot}=28)
- Focus group (n_{tot}=7)
- Cardiff residents (Mall-intercept sampling)

Third pretesting stage
- Verbal protocols (n_{tot}=7)
- Subject matter experts' accreditation (material reviewed by CaRRS, LREC NHS)

Figure 3:1 The pretesting stages involved in the development of the survey material

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The assessment of validity and reliability followed the battery work to conclude on the quality of the finalised instrument. The first refers to the degree to which a study measures what is intended to be measured and ascertains that the elicited figures are true measures of respondents' values or preferences. In SP studies, validity can be conceptualised in a number of different ways (Bateman et al. 2002). In this context, the results of a CV experiment would be valid if the respondent provided a valuation equal to the actual market price of the good being valued. However, the lack of an actual market price incommodes this assessment, as it is the objective of the experiment to approximate a 'true' value for the 'good' in question. Thus, the content, face and response validity were the most relevant types of validity that could be examined in this study.

Content validity examines the extent to which the concepts of interest are comprehensively represented by the items in the questionnaire (Guyatt, Feeny & Patrick 1993). Terwee et al. (2007) suggest that to claim content validity one must provide a clear description of the measurement aim, the target population and the concepts that are being measured. The assessment of content validity is to a large extent a "[...] *subjective expert appraisal task encompassing the entirety of the study from considering how reasonable the aims of the study are, to the clarity, interpretability and plausibility of the questions posed, and to the way the survey was conducted*" (Bateman et al. 2002, p.305). Consequently, the content validity assessment focused on the study design and implementation issues in conjunction with description of the 'good' being valued and its features.

Establishing content validity was an important step during the construction of the questionnaire. All survey material were inspected by a range of experts while also successfully underwent a series of scientific appraisal processes. The comprehensive pretesting stages add to the assertion of the content validity of this research. In total, 146 people participated in the pretesting phases. At all times, the obtained feedback conduced to identify issues that pertained to the relevance of the employed items in addition to wording and interpretation problems. Amendments such as eliminating irrelevant items, collapsing related statements and addressing a number of wording problems were implemented to improve the content validity of the survey material. The readability statistics provided by the Microsoft Office were also used to test the readability of the survey material. The resulting indices demonstrate the ease or difficulty met in reading a text. These were

FRE=59.3% (Flesch Readability test) and FKGL=9 (Flesch–Kincaid Readability test), both good readability indices, alongside a Fog Index of 8.45 and the Lexical Density of 24.66%[37].

Response validity refers to the extent to which the actions and thought processes of the respondents reflect their understanding of construct under study in the same way it is defined by the study itself. In this research, this was tested using a type of the think aloud protocol described in Converse and Presser (1986) as participating pre-test. In contrast to numerical data, where it is easy to determine the acceptability of items once the benchmarks are set, the qualitative data are more open to judgements. The qualitative data collected throughout the testing trials were recorded under the following criteria: the existence of different interpretations of the items in the participants' responses, instances of misunderstanding, participants' inability to provide a clear answer due to the complexity of the issue or contextual factors assumed in the item, and (non)- applicability of the items to the participants' situation.

There is a debate in the literature regarding the terminology of the several validity types and the overlap between the different annotations. This is the case with logical (or face) validity which does not always clearly differentiate from content validity. Logical validity typically refers to the degree to which a measure involves the performance being measured. In this context it cannot be explicitly assessed as there are no indicators of the respondents' actual choices to serve as a measure of validity other that the ranking of the scenarios. Others refer to face validity as a subtype of content validity (Bateman et al. 2002). Nonetheless, both types involve the investigation of whether the study asks the "right" questions in a clear, understandable, sensible and appropriate manner with which to obtain a valid estimate of the construct (in this case the WTP) being studied.

Similar issues emerge with criterion and construct validity. Criterion validity is claimed when a high correlation is achieved between the scores of a particular measure and that of a recognised ("gold") standard or criterion (Terwee et al. 2007). Construct validity requires that the scores on a particular instrument relate to other measures in a manner consistent with theoretically derived hypotheses concerning the concepts that are being measured (Kirshner & Guyatt 1985; Streiner &

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[37] As an example, Times magazine has an average score of 52% FRE and an average Fog Index of 11. A FKGL score of 8.2 would indicate that the text is expected to be understandable by an average student aged 13-14). Typically, technical documentation has a Fog Index between 10 and 15, and professional prose almost never exceeds 18, while a lexically dense text has a lexical density of around 60-70% and those which are not dense have a lower lexical density measure of around 40-50%.

Norman 1995). The lack of readily "gold standards" for measuring such values does not allow the direct assessment of those validity types. However, construct validity is secured from the agreement of the obtained stated values and the appropriate ranking of the respective scenarios in the CV module. Several considerations cast doubt on the accuracy of the actual figures given by the respondents, as all the questions were only hypothetical. Responses such as "*anything I have*" or "*a million*" may indicate a difficulty in thinking quantitatively rather than qualitatively (and emotionally) about undesirable outcomes. Moreover, the lack of "gold standards" or indicators of the respondents' actual choices to serve as a measure of validity further hamper the validity assessment. For this reason, the elicited valuations produced in the main survey will not be used for themselves, but as means of deriving relative values. This will effectively mitigate some of the concerns about the validity of the estimated figures.

Reliability refers to the extent to which a measure is successfully replicable overtime. Regardless of the survey type, the literature recommends three methods for establishing the reliability of data collection instruments applicable to questionnaires: parallel form, internal consistency and test-retest (Seliger & Shohamy 1989; Hatch & Lazaraton 1991).

Parallel form requires that expressions of similar content and function should be outwardly similar. The principle of parallel construction was applied during the second pretesting stage where the participants in one-to-one interviews and focus groups were asked to consider the most favourable alternative of items with same underlying meaning. However, the implementation of this experiment per se cannot be regarded as a measure of reliability as the purpose of the pretesting phase was not done in different time intervals to calculate reliability scores.

Internal consistency refers to the extent to which items in a (sub)scale are intercorrelated, thus measuring the same construct. In the case of willingness to pay studies, it may be argued that they represent a single construct, being all conscious actions to produce a monetary estimate. But at the same time, it may also be possible that each value is obtained through a different cognitive thinking strategy possibly influenced by other factors such as the ability to pay, the cognitive weight of the statement asked to evaluate and previous experiences related to what is being asked for evaluation. In this case, internal consistency does not apply to the questionnaire as a whole, but rather to such related factors.

The test-retest method constitutes the most frequently applied reliability check method, as it allows establishing the reliability of the questionnaire for stability over time. Generally, two considerations are important when using this method: first, that the variables measured could be subject to significant change over time, and second, that a repeated administering of the same questionnaire may result in the sensitisation of the participants to the issue researched (Hatch & Lazaraton 1991). Both concerns relate to the time between the test and retest, which implies that the decision about the appropriate length of time is crucial; however, little information is available on this issue. Sorum (1999) determined the test-retest reliability of WTP responses, by sending identical repeat questionnaires to less than a third of the total respondents in his study (n=77) six months following the completion of the study. However, the obtained WTP values were incontinent on the individual level although good on the group level.

In studies of other preference measures, test-retest reliabilities differed based on the given time interval; i.e. for low interval such as hours, days or weeks reported reliabilities were high whereas for grater time intervals reliabilities were low (see e.g. Sorum 1999). However, the reliability of the aggregate measures may be more important than that of the individual values. Measures of central tendency can be expected to be more reliable than individual values because of true changes in individuals' preferences, individuals' tendency to respond randomly, and flaws in the measuring instruments. For example, Kahneman and Knetsch (1992) found that respondents' WTP values were unresponsive to significant changes in the length of time to which valuation questions related whereas Carson et al. (1992) reported significant responsiveness. Consequently, it could be the case that eliciting preferences should be seen as more useful for group than for the individual decision making (Rutten-van Mölken et al. 1995). In addition to the time interval, Hatch and Lazaraton (1991) list other possible sources of low reliability when the test-retest method is use such as the settings, the participants' physical and psychological state (especially boredom on the post-test) and history.

Overall, in the context of contingent valuation, reliability is an issue frequently overlooked as the assertion of reliability involves a time component, which in return raises bias-related issues. Mitchell and Carson (1989) argue that in the context of CV bias is closely related with reliability, regardless of the efficiency of the employed CV scenario. Although the literature supports the temporal reliability

of CV results, there is an ongoing debate as to the extent procedures that may contribute to individual studies. That is because reliability exercises typically entail the repetition of studies at different points in time and so are not considered a reasonable requirement for each individual study. The time intervals involved in the reliability assertion provide a rational source of bias for a number of reasons: (1) instability or shift of respondent's attitudes towards the good being valued, (2) other intervening events that cannot be accounted for during the repetition of the experiment (e.g. respondent's financial situation), (3) the re-testing effect which describes the potential influence of individuals' subsequent views if surveyed more than once.

In the context of the present study, a number of other limitations did not allow the numerical assessment of reliability, such as the difficulty in securing the responses from the same sample and the time available for conducting successfully such an experiment before the launch of the main survey. To tackle this issue and enhance the reliability of the study, the study followed the guidelines provided in Mitchell and Carson (1989), according to which the sufficiently large sample size and the use of robust statistical techniques that guard against excessive influence by outliers compensate for the absence of other reliability assertion techniques.

3.4 Utility - Use & Utility of Instruments

Given that the questionnaire is the primary mean of elicitation, the accuracy of the derived values depends on the way the questions it entails are communicated. In this research, the survey instrument was designed in line with previously published CV studies, using a mixture of elements from contingent valuation and conjoint analysis. The questionnaire aimed at producing an estimation of how potential victims value the risk of victimisation, while addressing factors that potentially influence the stated values, such as alcohol consumption, risk taking and previous victimisation experience (direct and indirect). Following the recommendations by Mitchell and Carson (1989), Bateman et al. (2002) and the NOAA panel (Arrow et al. 1993), the survey instrument underwent extensive development, the process of which was described in Chapter 5. The reporting of the test construction practices, the resulting characteristics and use of the instrument was detailed to show the adequacy of the instrument for its intended purpose and reinforce its technical quality. Four pretesting phases were conducting, the first three aimed at addressing

qualitative issues regarding the literacy of the instrument and the last at collecting an adequate number of quantitative responses to design the analytical strategy that would be used with the main dataset. Table 3:1 concludes this section providing a summary of the research objectives in conjunction with the corresponding questions in the survey instrument and their properties.

Table 3:1 Network of interrelated determinants (adopted from Oppenheim 1992, pp. 26-29)

Research objectives	Relevant question	Level of data	Proposed analysis technique
Establish the readability and intelligibility of the questionnaire Examine the properties of collected data			Addressed in battery work
Construct mean/median WTP/WTA for all scenarios (injury descriptors & victimisation programme)	1-6, 11, 15	Ratio	Exploratory data analysis Non-parametric estimation: Kaplan-Meier estimator Parametric estimation: econometric modelling Bootstrap CIs
Provide alternative means for approximating emotional costs	7-9	Ratio	
Investigate perception of safety and fear of crime	12, 21	Nominal	
Investigate attitudes towards the introduction of a prevention programme (for victimisation reduction)	13-15	Nominal	
Investigate attitudes towards that programme when WTA element is added	14	Nominal	Univariate statistics Frequencies, percentages and appropriate measure of central tendency
Investigate perception of compensation	10	Nominal	Association between WTP and income for inferring construct validity
Investigate perception of difficulty in answering the questionnaire	16-17	Ordinal	Consider independent variables for modelling exercise
Investigate previous victimisation experience	18-20	Nominal Ordinal	
Investigate alcohol consumption attitudes	23-26	Ratio Ordinal Nominal	
Investigate ability to pay	22, 24-25, 27	Ratio	
Income, happiness and health	27, 28, 35	Ratio Ordinal	
Demographics	29-34	Ordinal Nominal	

3.5 Finalised Survey Instrument

The function of the battery work (described in Chapter 5) was to determine whether the questionnaire could meet the survey's aims and to ensure the accuracy and completeness of the questions' content. Taking under consideration the outcomes of the pretesting procedures, substantial amendments were made to the initial questionnaire. Although the pretesting was detailed in a later chapter, the final instrument was presented here to aid the reading flow of this work. Some of the actual text of the survey was provided in this section whereas a scanned copy of the full questionnaire was attached in Appendix 2 (§2.3-2.3).

3.5.1 Covering letter

The text of covering letter is attached in Appendix 2 (§2.3-2.3).

3.5.2 Valuation section

Table 3:2 Finalised scenarios and harm descriptors

Physical harm descriptors	Head	Torso	Limbs
MINOR	Scenario A Imagine that you are assaulted and suffer minor injuries to your face and head (e.g. slight scratching, bruising/black eye, other superficial injuries). These injuries will not need medical attention or prevent you from undertaking your usual activities. However, they will be noticeable by people around you.	Scenario C Imagine that you are assaulted and suffer slight injuries to your torso (i.e. chest, stomach) (e.g. slight scratching, minor cuts, other superficial injuries) that will not need medical attention but will be noticeable. They will not leave any significant scarring and will not prevent your normal activities.	Scenario E Imagine that you are assaulted and suffer slight injuries to your limbs (legs or arms) (e.g. scratches, cuts, other superficial injuries) that will not need medical attention nor prevent you from your daily tasks. They will not leave any significant scarring but they will be noticeable.

SEVERE	Scenario B Imagine that you are assaulted and suffer severe injuries to your face and head (e.g. broken nose, concussion, internal injuries) that require medical care and hospitalisation. They will not be life threatening but will prevent you from your daily tasks until they heal (e.g. need to take sick leave). Injuries are expected to leave minor scarring but no long-term disability.	

Scenario D
Imagine that you are assaulted and suffer serious injuries to your torso (i.e. chest, stomach) (e.g. broken bones, internal injuries) that will require medical care and hospitalisation. They will not be life threatening but will prevent you from your daily routine until they heal (e.g. take sick leave, assistance from others).

Scenario F
Imagine that you are assaulted and suffer serious injuries to your limbs (legs or arms) (e.g. broken bones) that will require medical care and hospitalisation. They will not be life threatening but will prevent you from performing your daily activities until they heal (e.g. need to take sick leave, assistance from others).

Psychological harm descriptors

MODERATE

Scenarios A, C, E
You will experience repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. These symptoms would last for approximately 2 weeks.

SEVERE

Scenarios B, D, F
You will experience nervousness, repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Those symptoms would last for minimum 6 months.

This question asks for the value you would place on the harms described above that result from an assault.
What is the **most** that you would pay to prevent the chance of this happening to you by **10**%?
What is the **most** that you would pay to prevent the chance of this happening to you by **50**%?
What is the **most** you would pay to **completely** prevent this scenario from happening to you?
What is the **least** amount of money you would want to be paid to experience this scenario?

3.5.2.1 Ranking, out-of-pocket losses and compensation

7. We are now going to ask you to rank the scenarios you have just read from 1 to 6, where **1 is the worst case**. Please give each scenario a number from 1 to 6 and use each number only once. *(State your answer in each box)*

---

8. We now want you pretend that you have actually experienced the harms described in each scenario.

How much do you think **you would need to spend** coping with each of them?

The sort of costs you might want to include are lost income through sick leave, psychotherapist visits, cosmetic surgery, job loss, shopping therapy, holidays, etc. As you answer this question, please consider the

emotional and psychological distress caused by each of the scenarios and do not include medical costs covered the NHS. We are only interested in your personal costs. *(State your answer in each box)*

9. Now we would like to know your opinion on **how much victims should be paid** in compensation for their pain and suffering for each of the above scenarios. *(State your answer in each box)*

---

10. What do you think is the most important feature to be used when working out how much someone should be compensated?   *(Tick only one or state)*
  The upset and inconvenience they suffer?
  The physical injuries they suffer?
  Both the above?
  None of the above?
  Do not know
  Do not wish to answer
  Other *(please state)*_____

---

11. If **any** of the six scenarios discussed in the previous questions could happen to you **tomorrow** and you do not know beforehand which one it would be: *(State your answer in each box)*
  What is the **most** you would **pay** to **avoid** it?
  How much would you need to **be paid** to **suffer** it?

3.5.2.2 Victimisation Prevention Programme (Q12-Q18)

The following questions ask your valuations on an imaginary a partnership programme to reduce non-domestic & non-sexual violence in your area. Please answer in the same way of thinking with the previous questions.

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12. Do you think that policing is the most effective way to reduce violent crime? *(Tick only one)*
        Yes   No   Do not know

---

13. Imagine that there is a partnership programme to reduce non-domestic & non-sexual violence. This programme has already been shown to work in an area very similar to yours and you have to vote on whether you would like the programme introduced in your area.

How would you vote on the introduction of this programme if it prevented non-domestic & non-sexual violent assaults to your community:
  13.1. By **10%**?   *(Tick one)*   For   Against   Do not know
  13.2. By **50%**?   *(Tick one)*   For   Against   Do not know

---

14. Suppose that the same programme **offered compensation to victims** that were assaulted. Knowing that, would you change your vote? *(Tick only one)*
  Yes   No   Do not know
  If YES, why?_____

15. Now suppose that the introduction of this programme into your area will be paid by contributions from the area residents like yourself and cannot be started unless a minimum amount of money is raised. Keeping in mind your current income and what you would give up if you made a contribution:

15.1. What is the most you would pay per month to reduce non-sexual violent assaults to your community: (State your answer)

15.1.1. By 10%? £ _____ 15.1.2. By 50% £ _____

15.2. What is the most you would pay per year to reduce non-sexual violent assaults to your community: (State your answer)

15.2.1. By 10%? £ _____ 15.2.2. By 50% £ _____

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16. Did you find the previous questions (Q: 1-15) difficult to answer? *(Circle only one)*
 Not at all difficult   Slightly difficult   Somewhat difficult   Very difficult   Extremely difficult

17. Are you confident in your responses in the previous questions (Q: 1-15)? *(Circle only one)*
Not at all confident Slightly confident Somewhat confident Very confident Extremely confident

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3.5.3 Non-valuation section

3.5.3.1 Previous victimisation experience (Q18-Q21)

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18. Has anyone threatened to use force or violence on you in any way that actually frightened you while you were outside of your own home or normal place of residence? Please consider all possible places except your home (e.g. in a pub, in the street, on public transport, at workplace).   *(Tick only one)*
Yes   No   Do not know   Do not wish to answer

19. Have you ever been violently assaulted or attacked while you were outside of your own home or normal place of residence? Please consider all possible places except your home (e.g. in a pub, in the street, on public transport, at workplace). **(If NO, skip to Q20)**   *(Tick only one)*
Yes   No   Do not know   Do not wish to answer
 (Continue)   *(Skip to Q20)*

  19.1. In total how many times has this happened? *(Tick only one)*
   Once   Twice   Three or more   Do not know   Do not wish to answer

  19.2. In terms of the most recent assault, how long ago did it happen? (Tick only one)
   0-6 months 7-12 months   12 + months   Do not know   Do not wish to answer

  19.3. At that time, had you personally had any alcohol immediately before the incident took place? *(Tick only one)*
   Yes   No   Do not know   Do not wish to answer

  19.4. Were you physically injured at that time? *(Tick only one)* **(If NO, skip to Q20)**
   Yes   No   Do not know   Do not wish to answer

19.5. Could you please specify the injuries that you sustained at that time? *(Tick all that apply or state)*

Location of Injuries

Type of injuries	FACE/HEAD	TORSO	LIMBS
Superficial injuries (e.g. Scratches/ Cuts, Bruising)			
Significant injuries (e.g. concussion, internal injuries)			
Broken bones (incl. Broken nose or teeth damage)			
Internal injuries			
Other (please state)_____			

19.6. Did you need medical treatment (e.g. from a doctor, a nurse, a dentist, etc.) at that time? *(Tick only one)*

Yes   No   Do not know   Do not wish to answer

19.7. Taking everything into account, how serious was that incident for you? *(Circle only one)*

Very serious   Fairly serious   Not very serious   Do not know   Do not wish to answer

20. Has anyone close to you (family member, friend, acquaintance) ever been physically injured because of a violent assault? *(Tick only one)*

Yes   No   Do not know   Do not wish to answer

21. How often, if at all, do you worry about becoming a victim of violent crime? *(Circle only one)*

Never   Just occasionally   Some of the time   All/most of the time

3.5.3.2 Alcohol Consumption (Q22-Q26) & Demographics (Q27-Q34)

22. How much do you usually spend weekly for leisure activities? £ _____

23. Do you drink alcohol? (If NO, skip to Q27) *(Tick only one)*
Yes   No   Do not know   Do not wish to answer

24. How much do you pay for one of your usual alcoholic drinks? £ _____

25. How many of your usual alcoholic drinks do you typically have in total on a single occasion? _____

26. Keeping in mind that 1 drink is ½ a pint of beer or 1 glass of wine or 1 single spirits:
MEN: How often do you have EIGHT or more drinks on one occasion?
WOMEN: How often do you have SIX or more drinks on one occasion?   (Circle only one)
Never   Less than monthly   Monthly   Weekly   Daily/Almost daily

27. How much money do you personally have each month to cover your total monthly expenditure (net income/excl. tax, include all benefits and student loans)? £ _____

28. Taking all things together, how happy would you say you are? (Circle only one)
Extremely unhappy 00 01 02 03 04 05 06 07 08 09 10 Extremely happy

29. You are: Male Female

30. In what year where you born? _____

31. What is your marital status? (Circle only one)
Married   Divorced/Separated   Widowed   Single   Other

32. Which of the following qualifications do you have? (Circle only one)
None   CSE/O' levels or GCSE   Apprenticeship or A/AS level   Degree or Diploma   Other

33. How would you describe your occupational status? (Circle only one)
Working   Unemployed   Looking after family or home   Retired   Student   Other

34. What is your ethnic group? (Tick only one)
White Mixed Asian or Asian British Black or Black British Chinese   Any other ethnic group

3.5.3.3 EQ-5D-5L: A health outcome measure (Q35)

35. Under each heading, please tick the ONE box that best describes your health TODAY

35.1. MOBILITY
I have no problems in walking about
I have slight problems in walking about
I have moderate problems in walking about
I have severe problems in walking about
I am unable to walk about

35.2. SELF-CARE
I have no problems washing or dressing myself
I have slight problems washing or dressing myself
I have moderate problems washing or dressing myself
I have severe problems washing or dressing myself
I am unable to wash or dress myself

35.3. USUAL ACTIVITIES (e.g. work, study, housework, family or leisure activities)
I have no problems doing my usual activities
I have slight problems doing my usual activities
I have moderate problems doing my usual activities
I have severe problems doing my usual activities
I am unable to do my usual activities

35.4. PAIN / DISCOMFORT
I have no pain or discomfort
I have slight pain or discomfort
I have moderate pain or discomfort
I have severe pain or discomfort

I have extreme pain or discomfort

35.5. ANXIETY / DEPRESSION
I am not anxious or depressed
I am slightly anxious or depressed
I am moderately anxious or depressed
I am severely anxious or depressed
I am extremely anxious or depressed

35.6. We would like to know how good or bad your health is TODAY.
This scale (see Appendix 2, §2.3-2.3) is numbered from 0 to 100.
100 means the best health you can imagine. 0 means the worst health you can imagine.
Mark an X on the scale to indicate how your health is TODAY.
Now, please write the number you marked on the scale in the box below:
YOUR HEALTH TODAY =

Chapter 4
Preparatory secondary data analysis

4.1 Introduction

This chapter presents the secondary data analysis that was carried out with two victimisation-focused datasets to explore victimisation and provide the basis for designing a CV survey that would provide estimates of intangible costs of violent crime. The first study used data from the 2008/09 British Crime Survey (BCS thereafter) to examine socio-economic and demographic predictors of violence and identify risk factors for greater emotional reaction by exploring victim's manifestation of emotional responses. The aim of that investigation was to assess intangible cost sources acknowledged in the crime literature (such as FoC) and to consider other sources yet unidentified. Assuming that intangible losses reflect emotion driven traits, the study set out to identify factors that influence the emotional outcome of a violent event. Although literature identifies demographic characteristics such as age and gender as factors that influence the emotional aftermath of a crime incident, there is no published evidence to suggest how such characteristics predict emotional stress among crime victims. The focus of the first study primarily lied on the psychological characteristics of a violent assault. Following the results of that investigation, the second study set out to explore the physical characteristics of a violent assault and developed the use of assault related A&E data to code the physical consequences of injury in a manner consistent with previous findings. The objective was to develop detailed injury descriptors by studying the physical consequences of violence in victims of assault with regard to their anatomical location and severity. These quantities altogether would provide a comparable set of plausible injuries resulting in a violent assault that would direct later investigations.

4.2 Exploring victimisation in the 2008/09 British Crime Survey

Victimisation is a traumatic event, with pervasive and deleterious effects on the victim's health and quality of life. The inflicted psychological and emotional stress surpasses the individual's usual psychological defences and the consequences can be chronic especially for victims of violent crime. The heterogeneity in victim's responses is partially explained by demographic characteristics but other triggering factors are yet unknown. The aim of this study was to examine the diversity in the manifestation of emotional responses observed in victims of violent crime and to investigate the relationship between the inflicted psychological distress and other crime-specific characteristics. To achieve these aims and further investigate the antecedents and consequences of violence in England and Wales the research presented in this chapter employed two different data sources: the 08/09 BCS.

The empirical work in this thesis was restricted to England and Wales not only for feasibility purposes but also to ensure comparability and compatibility with other major studies (e.g. Brand & Price 2000; Dubourg, Hamed & Thorns 2005; Walker et al. 2009). BCS was selected as the optimal source for assessing violence related issues, as it is the most reliable and constantly evolving systematic victimisation survey in the UK. Findings from such a large-scale survey are assets for smaller scale experimental research as they can provide a more in depth and consistent overview of violence and the consequences of violence-related incidents in the target population of the wider part of this project.

The BCS was introduced in 1982 by the Home Office and is currently being carried out every four years to "*estimate the extent of crime against individuals and their private property*" (Budd & Mattinson 2000, p. 3). It is the only UK victimisation study comparable to the US National Crime Victimisation Survey. The survey asks a representative cross-section of households (respondent's age≥ 16 years) about their crime experiences in the preceding year without repercussions for the participant's assailant(s) or the participant. The main purpose of its introduction was to provide an alternative to police measurement of crime in England and Wales to tackle the issue of unreported crime; phenomenon cited as "Dark Figure" by Blackburn (1993) referring to the significant number of crimes that remain unreported and unrecorded by the police. BCS data suggest that only a quarter of the crimes recorded in the BCS (comparable with recorded offences) were also reported to the

police (Mirrlees-Black et al. 1998), mainly because the victims underestimate the importance of the crime or the benefits resulting from such an action. Building on these findings, Brand and Price (2000) later estimated the "true" incidence of crimes against adults to be almost four times those recorded by the police.

One of the benefits in studying the BCS is that it remains unaffected by any recording or reporting practices due to the constantly developing methodology that evolves based on the years of application and thus provides a good measure of victimisation trends over time. Another value of the BCS is its questioning framework that elicits respondents' perceptions on crime, on CJS functionality and on quality of life; hence providing information that can be used to investigate influential factors on the population's life that is not limited by the context of crime. In addition to its rich content, BCS data are readily available in a variety of formats and the process of granting access for obtaining such datasets is quicker for authorised personnel compared to other data sources. As with all large-scale surveys though, BCS neither comes without limitations nor can be considered as a perfect measure of victimisation. A significant drawback is that it omits people under the age of 16. Another shortcoming is that it includes questions where the respondent is being asked to recall incidents that may have taken place even 24 months (some questions even ask for incidents within the period of five years) before completing the survey, a fact that might result in response errors. This raises another problem, as by limiting all crime related incidents to five years it constitutes research on long-term consequences of crime and victimisation unfeasible.

Nonetheless, BCS is an invaluable aid to violence related research. Especially the 2008-09 survey included significant improvements compared to those from previous years that pertained to the employed sampling technique and the recording mode. Briefly, a partially clustered sample design based on postcodes replaced the previously employed clustered design sample while the survey was extended to include children (aged 10 to 15 years) discarding the previous limit of 16 years of age for eligible respondents. It should be noted though that the data were not made available for public use and were not included on the 2008-2009 dataset. Moreover, the 08/09 BCS was recorded in a separate dataset including new aspects of research such as low-level geographic variables and self-completion modules that required the attainment of Special Licence Access from the UK Data Archive.

4.2.1 Research questions

This study will investigate the consequences of violence in the 2008/09 BCS dataset, with a special focus on their psychological impact. The research questions were as follows:

- o What factors relate to the likelihood of being a victim of crime? Are there specific demographic, social, and behavioural characteristics that are prevalent in victims of crime? How do these characteristics relate to the likelihood of repeat victimisation?

- o Can factor analysis techniques produce latent variables that capture the emotional responding to the crime incident? If so, what is the structure of the extracted factors and what does it imply?

- o How does the self-reported score of crime seriousness relate to offence-specific features? How does the self-reported score of crime seriousness relate to the individuals' characteristics?

- o How do offence-specific, socio-demographic and behavioural factors in victims of violent crime relate to the likelihood of demonstrating severe emotional distress?

4.2.2 Methodology

To investigate the features of violence at an epidemiological level, analyses were performed on the merged dataset of the 2008/9 BCS, including all the special licence access datasets (self-completion modules). These modules contain sensitive data, not available for standard access alongside the non-victim and victim form data. Hence, express permission had to be sought from the UK Data Archive before the files were released to use. After permission cleared on the 24th of February 2010, the STATA file versions of the 2008/09 BCS were accessed. Excluding confirmatory factor analysis, all analyses were conducted using the STATA SE11 package of statistical software. Confirmatory factor analysis was run using IBM SPSS AMOS, the SPSS extension for structural equation modelling (Arbuckle 2006).

4.2.2.1 Data and sample

The 2008/09 BCS comprised two main questioning domains (questionnaires), the non-victim form (NVF: n=46,286) and the victim form (VF: n=16,184). The NVF questionnaire contains respondent-level data and the deriving dataset consists of 1,847 variables. It covers a wide range of crime related topics, such as FoC and local area perceptions including local crime rates, prevention and security mechanisms and direct (theft, fraud etc.) or indirect (witnessing crime, antisocial behaviour etc.) experiences of crime. The NVF also provides insights into respondent's views, attitudes and experiences on CJS and police, on night-time economy and alcohol disorder and on crime and disorder in town centres, high streets and on public transport. The socio-demographic and the victimisation screening questions are part of the main NVF questionnaire.

The VF questionnaire only contains offence-level data and the dataset comprises 1,292 variables. The VF addresses only the respondents that have been identified as victims of crime in the NVF to whom it asks a number of additional questions on their previous crime experiences. The NVF can record details on a maximum of six different incidents for each respondent and the topics covered include the nature and circumstances of the incident, details of offenders, security measures, costs, emotional reactions, contact with the CJS and any known outcomes. The self-completion modules comprise three separate files, the Drinking Behaviour Module (SN 6369; n=33,903 and 21 variables), the Drug Use Module (SN 6370; n=33,879 and 208 variables) and the Interpersonal Violence Module (SN 6371; n=33,903 and 735 variables). These modules cover drug use, drinking behaviour and interpersonal violence (domestic violence, sexual victimisation and stalking) and are not considered parts of the main questioning domains but are subject to the Special Licence access (see Appendix 1, §1.1).

All the BCS files noted above were merged following the Home Office guidelines (Home Office 2010). A number of variables that would be of no interest to address the hypotheses in this study were omitted in the final dataset to aid navigation and further analyses. The variables included in the dataset of this study mainly described to socio-demographic, situational and behavioural factors, previous victimisation and offence-specific features. The selection of the variables was based on previous research in which they were shown to be associated with victimisation risks (see e.g. Walker et al. 2009; Brennan, Moore & Shepherd 2010) and violent injury severity (Hammig, Dahlberg &

Swahn 2001; Brennan, Moore & Shepherd 2006; Brennan, Moore & Shepherd 2010). All changes were merged into a new dataset (n=53,387), which was used for the subsequent analysis. Thus, although the number of observations may appear reduced in some of the assessed models, this reduction does not necessarily reflect missing data but the reduced amount of respondents answering in the modules mentioned above and used for the modelling exercise.

4.2.2.2 Analytic strategy

The dataset deriving from the merge of the 2008/09 BCS modules was used to identify violence predictors and describe the factors that influence victims' responses to a violent incident. For the latter, the analysis explored variables reflecting victim's experiences, such as ratings, emotional reactions and incident characteristics. The statistical procedures can be outlined in five successive steps.

The first step concerned the investigation of the variables of interest. That included (re)coding, describing and cleaning the merged dataset to aid further analyses. Regarding general victimisation characteristics, three categories of offence-related variables were studied: deliberate use of violence on the respondent, physical outcome including injury characteristics and emotional reaction including ratings of seriousness. The use of violent force was one of the VF screening questions in the survey and the question asked whether anyone had deliberately used force/violence on the respondent (v: *delibvio*). The recorded information on physical outcome pertained to injuries and related characteristics attributed to the crime incident. Regarding crime seriousness, all the respondents in the VF section of the survey (including individual responses from the interpersonal violence module) were asked to rate the crime according to their own perception of seriousness, from a scale of 1 to 20 going from minor to major (v: *scorcrm2*). The exact wording of the question was *"I would now like to ask you how serious a crime you personally think this was. On a scale of 1 to 20 with 1 being a very minor crime like theft of milk bottles from a doorstep, to 20 being the most serious crime of murder. How would you rate this crime on the scale from 1 to 20?"* It should be noted that two binary[38] variables described general victimisation in the 2008/09 BCS dataset: *victim* (n= 16,184) and *bcsvictim* (n= 14,375). The first was employed in this study for further analyses as it is the one that directly codes

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[38] Coded yes:=1 and no:= 0.

the respondent as a victim. The *bcsvictim* variable denoted respondents that positively identified themselves as having the experience of a crime in the 12 months before the 2008/09 BCS, without any more information on whether it was them that were directly involved in the crime situation or whether the crime was considered as a violent one or not.

The second step concerned the study of victimisation through a series of logistic regression models. Drawing from the relevant literature, the selected variables were gender, age, marital status, income, educational qualifications, poor health and alcohol consumption. Gender was replaced by a dummy variable coded as 1 for male and 0 otherwise. Similarly, education was replaced by a dummy variable coded as 1 for any qualifications and 0 for none (see the levels in Table 4:1) and poor health was generated from the self-ratings of health, coding as 1 responses indicating 'bad' health status and 0 all levels from 'very good' to 'fair'. Alcohol consumption was generated from the core sample of the BCS to tackle the lack of a variable in the BCS codebook that denotes alcohol consumption (and not harmful drinking; see Table 4:3). Income was re-coded using a dummy variable coded as 1 for household income up to £14,999 p.a. and 0 otherwise.

The modelling exercise initially employed two demographic variables as predictors denoting age and gender (Model A). Next, two socio-demographic variables were added to the initial model (ethnicity and marital status, Model A1). The third model included two socio-economic variables describing respondents' educational attainment and income (Model A2). The final model included two health related variables, one as a general indicator of poor health (as rated by the respondents as their health status at the time of the survey) and the other describing alcohol consumption. Repeat victimisation was assessed using the same models employed to study victimisation predictors. The selection of the outcome variable implied that the sample used in the regression models did not include the non-victim population as the testing was between two main outcomes, coded as 1 if result denoted series of victimisations and 0 if the victimisation was recorded as a single event. To assess the applicability of the victimisation models to both men and women, the regressions for the main models were carried out separately for each gender group.

The third part of the analyses was the study of the variables denoting victims' emotional responses. The 08/09 BCS asked respondents of the VF section of the survey to recall and describe their emotional reaction (if any) exactly after the incident took place. The wording of the question

was: "*Many people have emotional reactions after incidents in which they are victims of crime. Did you personally have any of these reactions after the incident?*" If the respondent confirmed an emotional reaction, the question was followed up with a list of emotional reaction types: Anger, Shock, Fear, Depression, Anxiety/panic attacks, Loss of confidence/feeling vulnerable, Difficulty sleeping, Crying/tears, Annoyance, Other and the respondent was asked to indicate which of those described his/her emotions best. The emotional reaction section concluded with an overall assessment of the respondents on the overall affect the incident impinged on them by asking, "*Overall, how much were you affected? Were you affected ...1. Very much 2. Quite a lot 3. or just a little?*" All respondents that indicated having an emotional reaction after their experience of victimisation were asked to specify which of the ten different types of reactions provided described their emotions best.

To examine and appreciate the dimensionality of the obtained data on the emotional response to violence, factor analysis techniques were used. Initially, correlations between the reaction variables were computed and then exploratory factor analysis (EFA) was used to identify any common denominators; i.e. to assess how the emotional reactions variables relate and group on the basis of inter-variable correlations. Confirmatory factor analysis (CFA) was then used to confirm and conclude on the factor structure that was extracted in the EFA.

EFA offers a systematic simplification of a set of interrelated factors of interest by exploring their potential underlying structure without imposing any predetermined formation on the outcome (Child 1990). It is based on the fundamental assumption that some underlying factors, which are smaller in number than the number of observed variables, are responsible for the covariation among the observed variables (Kim & Mueller 1978). In essence, EFA is a data reduction method that assumes the existence of an unobserved construct and by examining properties and influences within the observed data extracts a number of unique latent constructs (factors) that describe the given set of variables. This study used EFA to reduce the set of variables denoting emotional reactions to a number of latent variables; i.e. to examine whether emotional reactions could be explained in fewer variables. The purpose of the EFA application was to determine the number of latent constructs underlying the set of variables on emotional reactions, to provide a means of explaining variation among these variables using the extracted factors and to define their latent constructs (meaning).

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Prior to any analyses, all variables denoting emotional reactions were screened for coding errors and missing responses. The factorability of the correlation of the items denoting emotional reactions was examined using a number of criteria. Cronbach's alphas and Kaiser-Meyer-Olkin (KMO) indices were calculated in addition to the pairwise correlation coefficients to test the adequacy of the sample for the analysis. The Bartlett's test for sphericity was used (H_0: the intercorrelation matrix comes from a population in which the variables are noncollinear, i.e. an identity matrix, and that the non-zero correlations in the sample matrix are due to sampling error) and the uniqueness of the variables' variances ("1-uniqueness") was assessed before concluding on the number of items to be used. Regarding extraction and rotation, both principal components analysis (PCA) and maximum likelihood (ML) extraction methods were tested and PCA was selected as the most suitable technique for the purpose of this analysis. Oblique (oblimin) rotation was applied using a numerical maximisation procedure to ensure that the global optimum was converged (rather that the local optimum). The Kaiser criterion (threshold of 1) was applied in determining the number of factors that should be retained in the analysis, also illustrated by a screeplot as the point where the curve starts to flatten (Cattell 1966).

Before deciding on the rotation, a number of solutions was examined followed by both orthogonal (varimax) and oblique (oblimin) rotations of the factor-loading matrix. The decision was based on their impact on the factor loadings as the oblimin rotation provided the best-defined factor structure where all items had primary loadings over .5 and the items with lower cross-loadings had strong primary loadings elsewhere.[39] The determination of the final solution was based on the eigenvalues and the interpretation of the resulting factors. Given that eigenvalues denote the amount of variance associated with the extracted factor, only those with variance greater than 1 were included in the final solution as those that do not meet this criterion cannot be considered better than a single variable due to standardisation (which constitute the variance of each variable equal to1). The extracted factors were labelled in a manner suitable to the contribution of the items underlying their structure.

CFA was employed to test the hypothesis provided by the EFA about the structure and the number of dimensions underlying the set of variables on emotional responses. EFA showed that

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[39] The varimax rotation failed to meet the minimum criteria of primary factor loading of .4 or above and no cross-loading of .3 or above.

there were three dimensions underlying the emotional responses to a victimisation event. The interpretation of the resulting factors based on the effect of the items on their structure indicated that these factors could be accordingly labelled as severe, moderate and minor emotional reaction respectively. CFA was used to assess this structure, to test alternative structures and identify a suitable structure underlying characteristics of emotional reactions to victimisation. The same dataset was employed containing 13,620 observations for each type of emotional response (Anger, Shock, Fear, Depression, Anxiety/panic attacks, Loss of confidence/feeling vulnerable, Difficulty sleeping, Crying/tears, Annoyance, Other). All the variables were standardised prior to any analyses (mean=0 and SD=1) and the variable 'other' was not maintained in the CFA as it significantly distorted any results. Although EFA indicated a 3-factor specification, the preliminary results on the fit of that model indicated that alternative specifications should be tested. For parsimony, only the final solution was presented. In contrast to other traditional statistical techniques, CFA relies on a number of statistical tests to determine the significance of the model under study and the resulting fit indices provide a descriptive measure of the model's fit (Hair et al. 2009). Generally, the model fit determines how well the factor structure in the postulated model accounts for the correlations inherent in the dataset. The reporting followed Schreiber et al.'s (2006) typology, in which the major fit indexes were categorised based on their assessment use (predictive fit, comparative fit, parsimonious fit, general fit; see Table 4:9).

Although both EFA and CFA incorporate measured variables and latent constructs, the difference between these techniques lies in their a-priori assumptions and requirements. EFA was primarily used to suggest a model as no pre-existing knowledge was available on the structure (dimensions) underlying emotional responses. CFA on the other hand cannot be used in such explanatory manner, as it requires an exact specification of a model prior to any analysis. The specification pertains to the factor structure of a set of observed variables in a dataset and should each time outline the number of the factors to be used and the items that load on each factor. Hence, instead of exploring the data, it provides a fit assessment through a number of indices (parameters) that can be used to either validate or dispute a hypothesised model. In practice, the analysis starts with defining a model while assuming a potential relationship pattern and then tests this hypothesis statistically (H_0: that there is relationship between the observed variables and their underlying latent constructs) (Kline 1998).

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The fourth step of this analysis focused on assessing the self-reported scores of seriousness on the victimisation event. The purpose of this investigation was to identify factors that influence respondent's perceptions of crime seriousness. This section used the actual ratings of seriousness (ordinal variable: a seriousness scale from 1 to 20) and although respondents were given a point of reference prior to rating (e.g. minor crime like theft of milk bottle rates a 1 and most serious like murder as 20), the results should be treated with caution due to the subjective nature of the question. Wilcoxon-Mann-Whitney (WMW) and Kruskal-Wallis (KW) tests were used to assess the effect of a number of offence-specific variables on these scores. Since the dependent variable (seriousness score) was ordinal and not normally distributed, the WMW was used for testing the relationship among the independent binary variables. The generalised form of the Mann-Whitney test, the KW test method, was employed to test the relationship among the independent variables with more levels. Next, a set of the socio-demographic, behavioural and incident-specific variables were set as covariates in an ordered logistic regression model to examine their effect on the recorded scores of crime seriousness. The interpretation of the coefficients followed that of the logistic regression with the main difference being that 19 transitions were estimated instead of one.[40] Thus, a positive coefficient would suggest an increased chance of a subject with a higher score on the independent variable being observed in a higher category and vice versa.

The study relied on the simplified likelihood ratio statistic suggested by Smith (1987) to detect if the covariate variables added in stages to the initial model were endogenous or not (see results Models C2 and C3). The statistic requires the retrieval of the residuals from the models using tobit regression and calculates as a likelihood ratio which tests the exogeneity of the specified regressors suspected of being endogenous. Under the null hypothesis, each of the added variables is appropriate to be inserted as a regressor. Thus, if the test is rejected, then the variable should be treated as endogenous; if the test fails to be rejected, then the variable can be considered as exogenous. The exogeneity test was run with two different specifications; the first included the endogenous variables on the characteristics of the effect of crime and the second on the other characteristics of crime. If the null hypothesis of exogeneity is rejected with any of these

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[40] That is because the employed response variable described the actual score from 1 to 20 as provided by the respondents. The number of transitions also equals the number of cut points used for the adjacent levels of the response variable.

specifications, then the use of the variables would be justified. However, it should be noted though that such a methodology can be sensitive to type II errors based on the model specification; i.e. the null hypothesis of endogeneity can be rejected under one specification and fail to be reject it if a different specification is used.

Last, multiple regression techniques were used to build models with the factors resulting from the EFA (OLS) and the CFA (logistic) as predictors and the victimisation predictors alongside the factors that influenced the score of crime seriousness as independent variables. A number of different models were tested before concluding on the variables that would be used as regressors in the final model to determine which of those influenced the likelihood of demonstrating a serious emotional reaction. The final selection included a number of socio-demographic characteristics (gender, age, ethnicity, household income, marital status educational qualifications) and four offence-specific variables denoting use of force/violence, sustained injuries and whether victim reported alcohol used prior to the incident. Considering these variables, the analysis in this section was restricted to violent victimisation.

Three distinct approaches directed the selection of the outcome variable. Final model 1 employed the score from Factor 1resulting the EFA that was named 'serious emotional reaction'.[41] Given that the scores comprised continuous data, Ordinary Least Squares (OLS) regression was used. Final model 2 used as the dependent variable a newly created binary variable describing serious emotional reaction, in response to the CFA results on the structure underlying the set of variables on emotional responses. CFA indicated that Dimension 1undelied the emotional responses on Depression, Anxiety/panic attacks, Crying/tears, Loss of confidence/feeling vulnerable and Difficulty sleeping. Consequently, the new variable (v: *serious1*) was coded 1 if any of those variables was recorded as a direct result of victimisation and 0 otherwise. Following the coding of this variable, logistic regression was employed as the most suitable regression technique.

The concerns on the reliability of combining this number of emotional outcomes altogether directed the third approach, according to a new variable that was generated to denote a more severe emotional outcome in which only items in the CFA that did not have cross-loadings from the

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[41] EFA's Factor 1 contained loadings from emotional responses describing Shock, Fear, Depression, Anxiety/Panic attacks, Crying/tears, Loss of confidence/feeling vulnerable and Difficulty sleeping.

second latent variable (named 'less serious emotional reaction'). Similarly to the coding approach of the second final model, this new variable (v: *serious*) was coded 1 if the emotional response to the victimisation event was Anxiety/panic attacks or Depression and 0 in cases that none of these two responses were recorded. The Diagnostic and Statistical Manual of Mental Disorders, DSM-IV-TR, (American Psychiatric Association 2000) further reinforced this selection as it identifies these two responses as psychiatrically diagnosable outcomes that also relate to post-traumatic stress disorder (also see §3.2.2.1). As in the previous model, logistic regression was used due to the type of the dependent variable.

In all analyses, independent variables were added gradually so that the multi-factorial nature of violence could be examined, a technique commonly used in regression analyses to highlight the impact that different independent variables have on predictive models (Clark, Oswald & Warr 1996). At all times variables were screened for collinearity through the STATA's internal test to avoid bias in the predicted model as it ensures the removal of highly collinear ($\exists$ high correlation) independent variables and instead uses the remaining covariates for the best possible fit of the respective model. However, such action was not required in any of the analyses.

A number of fit statistics were used to determine the fit of the models to the data, each time depending on the outcome variable and the type of analysis. Although the same statistics are detailed in Chapter 6, a brief explanation follows. For logistic regression, the pseudo R^2 statistic (Hosmer & Lemeshow 1989) was used for assessing the strength of associations, a statistic typically bounded by zero and one where greater values suggesting greater fit (Bateman et al. 2002). The McFadden pseudoR^2 statistic, R^2_{MF} (McFadden 1974), was used as a measure of the strength of association, where values of 0.2-0.4 are considered highly satisfactory. The R^2_{MF} is a frequently cited statistic in logistic regression as it provides the logical analogue to percentage of explained variation given by R^2 in OLS. The chi-square statistic was used to complement the R^2_{MF} and assess the overall fit of the logistic regression model to the data as it indicates whether including a variable improves or not the overall fit. If the chi-square statistics is significant, then the newly added variable is considered a significant predictor in the equation and hence the fit is improved. The Akaike Information Criterion, AIC (Akaike 1974), was also used in identifying the most appropriate model where the lowest AIC statistic was deemed as the most appropriate.

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For OLS regression, the coefficients of determination, R^2 and adjusted R^2, were used for assessing judging the fit and MSE and F statistics for assessing overall explanatory power of the models. The R^2 is interpreted as the proportion of the sample variation in the dependent variable that is explained by the OLS regression line, the MSE reflects the model's accuracy in estimating the observed probability and the F statistic uses the MSE value to test whether the estimated model is statistically significant. In terms of actual values, the higher R^2 the better the fit of the model and a large F statistic coupled with a small p-value (or F-significance) implies that the model is statistically significant.

4.2.3 Results

4.2.3.1 Sample characteristics

4.2.3.1.1 Socio-economic characteristics

The merged dataset of the sample comprised 53,178 observations. It should be noted though that on occasions questions address the household rather than the individual (e.g. household income) and that the numbers and percentages presented exclude the missing/invalid responses and hence may not add up to the total. Table 4:1 presents the main socio-economic and demographic characteristics that were used to describe the core sample.

Table 4:1 Summary of the demographic and socio-economic characteristics of the 08/09 BCS core sample

	Sample[1]	
Total number of observations	53,387	
Males	24,017	(45.54%)
Age (in years)	49.64	(SD= 38.71)
Ethnicity		
White	48,770	(92.50%)
Mixed	376	(0.71%)
Asian or Asian British	1,862	(3.53%)
Black or Black British	1,136	(2.15%)
Any other ethnic group	578	(1.10%)
Marital status		
Married	23,553	(44.69%)
Separated	1,758	(3.34%)

Divorced	5,650	(10.72%)
Widowed	5,631	(10.68%)
Single	16,115	(30.57%)
Education		
None	13,552	(25.76%)
O' levels or GCSE	11,056	(21.02%)
Apprenticeship or A/AS level	8,993	(17.10%)
University Degree or Diploma	16,910	(32.15%)
Other	2,089	(3.97%)
Employment status		
Employed	29,989	(57.03%)
Unemployed	1,500	(2.85%)
Looking after home/family	2,928	(5.57%)
Retired	13,281	(25.26%)
Student	1,762	(3.35%)
Other	3,124	(5.94%)
Total household income per annum		
Under £2,500	1,279	(3.13%)
£2,500-£4,999	1,637	(4.01%)
£5,000-£9,999	5,444	(13.33%)
£10,000-£14,999	4,974	(12.18%)
£15,000-£19,999	4,060	(9.94%)
£20,000 or over	23,437	(57.40%)
Self-rated health		
Very good	19,683	(37.38%)
Good	20,506	(38.94%)
Fair	9,191	(17.45%)
Poor	2,768	(5.26%)
Very poor	512	(0.97%)

[1]Numbers may not add up to total due to missing data; percentages may not add up to total due to rounding

4.2.3.1.2 Victimisation related characteristics

Victimisation and offence related characteristics derived from both the VF section and the Interpersonal Violence module (n=33,903). From the 52,736 respondents that provided a complete set of answers for the victimisation screening questions in the NVF section of the survey[42], 16,187 respondents (7,725 men and 8,462 women: 30.69% of the total sample) were identified as victims of crime and completed the VF section of the survey.

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[42] The total number of observations in the merged 08/09 BCS dataset was 53,387. Given that this number includes missing values, the total number of observations changes across the variables in the survey.

Regarding the use of violent force, 4.4% (n=2,319) of the BCS sample answered positively. A cross-tabulation with the victim identifier revealed that from the 16,184 victims in the core sample, 14.33% reported use of violent force, while 3,217 respondents (19.88% of the VF sample and 6.21% of the total sample) indicated that they have been threatened by the use of violence. Regarding victimisation, 2,984 incidents (17.72% of the VF sample) were coded as "victimisation series" from which 1,482 (65.37%) respondents indicated the deliberate use of violent force at least once, 397 (17.51%) twice and 388 (17.12%) three time or more. The most common type of assault was found to be punching/slapping (35.32%) followed by grabbing/pushing (34.61%) and verbal abuse (11.69 %).

From the 16,184 victims in the VF of the BCS, 6.9% (1,111 cases) specified injuries which were then classified according to their type into the categories presented in Table 4:2 (e.g. minor/severe bruising, scratches and cuts, broken bones etc.). By grouping the variables denoting injuries in categories that reference main body parts, the facial and head injuries comprise 61.75% of the total of observed injuries (n=686), suggesting that the head was the most injury-susceptible part of the body in a violent assault. However, the fact that BCS does not include a comprehensive description of injuries using a similar classification does not allow for further conclusions (e.g. severe bruising, cuts or scratches could be anywhere in the body). Table 4:2 presents the summary of these characteristics including the seriousness ratings grouped in three levels.

Table 4:2 Summary of victimisation descriptors in the 08/09 BCS sample (includes VF section and the Interpersonal Violence module)

	Sample (n_{tot}=52,736)	
Threatened with violence	3,217	(6.10%)
Once	1,738	(54.03%)
Twice	575	(17.87%)
Three times or more	904	(28.10%)
Victims	16,187	(30.69%)
Under the influence of alcohol	847	(5.23%)
Repeat Victimisation	2,984	(17.72%)
Deliberate use of violent force	2,319	(14.33%)
Repeated use of violent force (3 times or more)	388	(17.12%)
Types of force employed		
Grab/push/pull	821	(34.61%)
Punch/slap	740	(35.32%)
Kick	38	(1.81%)

Weapon use (e.g. stabbing, shooting, beating)	87	(4.16%)
Sexual assault (including rape)	29	(1.39%)
Verbal abuse	245	(11.69%)
Head butting	24	(1.15%)
Attempted asphyxiation (strangle/choke)	5	(0.24%)
Other	106	(5.07%)
Physically Injured	1,112	(6.61%)
Types of sustained injuries		
Minor bruising or black eye	651	(58.60%)
Severe bruising	245	(22.05%)
Scratches	61	(5.49%)
Cuts	79	(7.11%)
Broken bones	15	(1.35%)
Broken nose	10	(0.90%)
Broken/lost teeth	5	(0.45%)
Chipped teeth	2	(0.18%)
Concussion or loss of consciousness	4	(0.36%)
Facial/head injuries (no mention of bruising)	14	(1.26%)
Other types of injuries	25	(2.25%)
Medical attention required	234	(21.04%)
Seriousness of the incident (scale 1 to 20)		
Very serious (14 to 20)	1,031	(6.21%)
Fairly serious (7 to 13)	3,817	(22.99%)
Not very serious (1 to 6)	11,752	(70.80%)

4.2.3.2 Study of victimisation

Logistic regression models were used to study victimisation features. The variables used in the modelling exercise are presented in Table 4:3.

Table 4:3 Description of variables in the BCS logistic models on victimisation

Variable	Description	
Victim	=1 if victim of violent crime in the past 5 years of the survey	=0 the remainder of the BCS core sample
RepVictim	=1 if victim had multiple victimisation events entries	=0 if victim was recorded in a single entry
RepForce	=1 force was used on the victimisation series (dummy)	=0 if no force was recorded in victimisation entries
Ndelibv	=1 if violence force was used in one incident	Takes values from 2 up to 7, depending on the number of incidents where violent force was used
Age	Years (interval)	(Capped at 100 years of age)
Gender	=1 if male (*male*: dummy)	
Ethnicity	=1 if white background (*white*: dummy)	=0 any other ethnic background from the available categories
Marital	=1 if single	Married=2; Separated/ Divorced=3;

status		Widowed=4
Low Income	=1 if household income was up to £14,999 p.a. (dummy)	=0 all remaining categories from £15,000 and above
Education	=1 if respondent had educational qualifications (all categories other than 'none') (*loweduc*: dummy)	=0 all remaining categories
Poor health	=1 of health rating was 'bad' (dummy)	=0 the remainder categories denoting levels from 'very good' to 'fair'
Alcohol	=1 if respondent consumes alcohol (dummy)	=0 if not a drinker in the past 12 months

P(Victim)	Age	Gender	Ethnicity	Marital status	Low Income	Education	Poor health	Alcohol
	Model A			*Model A1*		*Model A2*		*Model A3*

4.2.3.2.1 Victimisation predictors

Results initially indicated that both age and gender were significantly associated with the likelihood of victimisation. The direction of that effect was negative in terms of age and positive in terms of gender which translates to younger people of male gender being more at risk for victimisation (n=52,669[43]; see Model A in Table 4:4). In the following model (Model A1) the signs and significance of these variables remained the same and while the added variables indicated that compared to singles, separated or divorced individuals were more at risk for victimisation. Being white was found to be positively associated with the likelihood of victimisation but the association was not significant. In Model A2, low income was positively but not significantly associated with victimisation whereas the attainment of educational qualifications was negatively associated with the victimisation. In the final model (A3), although alcohol consumption was found to be a significant victimisation predictor at the 0.05 level, the number of observations within the model was significantly reduced (n= 6536) due to the low number of cases in the added variable. Poor health was positively and significantly associated with victimisation. Similarly, income category was positively and significantly associated with victimisation at the 0.001 level of significance, suggesting that lower income was a significant risk factor in the sample. Models overall were statistically significant and although the fit seemingly improved step by step due to the inclusion of more variables, caution is advised due to the deriving low figures of Pseudo R^2.

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[43] The lower total number of observations is due to the missing values for the variables used in the logistic regression STATA uses a listwise deletion by default, which means that if there is a missing value for any variable in the logistic regression, the entire case will be excluded from the analysis.

Table 4:4 Logistic regression models on victimisation (v: victim) in 08/09 BCS core sample

Variables	Model A	Model A1	Model A2	Model A3
Age	-.029*** (0.001)	-.035*** (0.001)	-.035*** (0.001)	-.029*** (0.007)
Male	.109*** (0.020)	.120*** (0.019)	.124*** (0.023)	.186*** (0.051)
White		.062+ (0.036)	.078+ (0.041)	.061 (0.084)
Marital status				
Married		-.061* (0.026)	-.068* (0.029)	-.070 (0.070)
Separated/ Divorced		.294** (0.033)	.282*** (0.036)	.464** (0.147)
Widowed		-.130* (0.052)	-.056 (0.010)	-
Low Income			.004+ (0.010)	.079*** (0.021)
Education			-.174*** (0.031)	-.278** (0.087)
Poor health				.829*** (0.190)
Alcohol				.186* (0.076)
Constant	.491*** (0.028)	.388*** (0.041)	.943*** (0.068)	.874*** (0.212)
Statistics				
N	52669	52648	40796	6536
Pseudo R^2	0.048	0.052	0.064	0.011
Chi^2	3119.856***	3360.110***	3319.711***	97.924***

Significance: + 0.10; * p<.05; **p<.01; *** p<.001
Standard errors of the regression coefficients in parentheses

	Estimation sample characteristics		
	Mean (SD)		
Age	48.689 (18.961)	48.689 (18.961)	48.968 (17.767)	24.335 (4.174)
Male	.456 (0.498)	.456 (0.498)	.466 (0.499)	.452 (0.498)
White		.925 (0.263)	.928 (0.258)	.888 (0.315)
Marital status				
Married		.447 (0.497)	.463 (0.499)	.188 (0.391)
Separated/Divorced		.141 (0.348)	.153 (0.360)	.032 (0.177)
Widowed		.107 (0.309)	.101 (0.301)	-
Low Income			2.649 (1.298)	2.786 (1.268)
Education			1.238 (0.426)	1.099 (.299)
Poor health				.020 (0.141)
Alcohol				.849 (0.357)

To assess the applicability of the main model (A3) to both men and women, the sample was broken down to gender groups as seen in Table 4:5 below.

Table 4:5 Main model on victimisation (A3) in gender groups from the 08/09 BCS core sample

Variables	Sex = Male	Sex = Female
Age	-.038***(0.009)	-.023* (0.009)
White	.117 (0.128)	.032 (0.114)

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Marital status		
Married	.088 (0.108)	-.157 (0.094)
Separated/Divorced	-.384 (0.371)	.575*** (0.165)
Widowed	-	-
Low Income	-.027 (0.033)	-.109*** (0.028)
Education	.286* (0.129)	.281* (0.118)
Poor health	.575* (0.291)	.967*** (0.254)
Alcohol	-.008 (0.129)	.272** (0.094)
Constant	.667* (0.268)	.193** (0.255)
Statistics		
N	2952	3584
Pseudo R²	0.007	0.016
Chi²	27.66***	79.69***

Significance: + 0.10; * p<.05; **p<.01; *** p<.001
Standard errors of the regression coefficients in parentheses

4.2.3.2.2 Repeat victimisation predictors

Table 4:6 shows that age was negatively and significantly associated with the chance of being a repeat victim, indicating that younger people were more likely to be repeatedly victimised; corroborating the results of the victimisation models. Gender was not found to be significantly associated with the outcome under evaluation and the direction of the association changed compared to the previous models showing that females were positively (but not significantly) associated with repeat victimisation. On the other hand, the strong relationship between marital status and victimisation was maintained with separated or divorced respondents reportedly more likely to be involved in a series of victimisation events compared to their single counterparts. Low income was consistently negatively and strongly associated with the dependent variable suggesting that lower income is a risk factor not only for victimisation but also for repeat victimisation at the 0.001 level of significance. Contrary to the victimisation predictors, the attainment of educational qualifications did not interact significantly with the assessed outcome, whereas poor health was once again found to be a significant risk factor for repeat victimisation.

Overall, results suggest that the likelihood of repeat victimisation was strongly associated with age, marital status, low income and poor health. Although all models were statistically significant, the low figures of pseudo R^2 paired with the resulting constants that were all found to be significant at the

0.001 level indicate that there is some variation in the models that cannot be explained or well captured through the specified control variables.

Table 4:6 Logistic regression models on series of victimisations (v: repvictim) in 08/09 BCS core sample

Variables	Model B	Model B1	Model B2	Model B3
Age	-.005*** (0.001)	-.004* (0.002)	-.005* (0.002)	-.006** (0.002)
Male	-.079+ (0.041)	-.070+ (0.042)	-.066 (0.046)	-.069 (0.046)
White		-.094 (0.072)	-.034 (0.082)	-.035 (0.082)
Marital status				
Married		-.103+ (0.055)	-.007 (0.061)	-.004 (0.061)
Separated/ Divorced		.192** (0.066)	.200** (0.070)	.199** (0.171)
Widowed		-.210 (0.128)	-.113 (0.137)	-.089 (0.137)
Low Income			-.109*** (0.020)	-.096*** (0.020)
Education			-.004 (0.065)	-.009 (0.065)
Poor health				.342*** (0.086)
Constant	-1.275*** (0.060)	-1.228*** (0.087)	-.976*** (0.132)	-.990*** (0.133)
Statistics				
N	16175	16172	13376	13374
Pseudo R²	0.001	0.003	0.006	0.007
Chi²	19.547***	48.433***	70.611***	86.101***

Significance: + 0.10; * p<.05; **p<.01; *** p<.001
Standard errors of the regression coefficients in parentheses

	Estimation sample characteristics			
	Mean (SD)			
Age	41.917 (16.007)	41.917 (16.007)	42.095 (15.158)	42.095 (15.158)
Male	.477 (0.499)	.477 (0.499)	.484 (0.499)	.484 (0.499)
White		.914 (0.280)	.918 (0.275)	.918 (0.275)
Marital status				
Married		.405 (0.491)	.415 (0.493)	.415 (0.493)
Separated/Divorced		.161 (0.367)	.167 (0.373)	.167 (0.373)
Widowed		.047 (0.212)	.046 (0.209)	.046 (0.209)
Low Income			2.807 (1.273)	2.807 (1.273)
Education			1.164 (0.370)	1.164 (0.370)
Poor health				.064 (0.245)

To assess the applicability of the main model (B3) to both men and women, the sample was broken down to gender groups as seen in Table 4:7 below.

Table 4:7 Main model on series of victimisations (B3) in gender groups from the 08/09 BCS core sample

Variables	Sex = Male	Sex = Female
Age	-.006*(0.003)	-.006* (0.003)
White	.114 (0.121)	-.160 (0.112)
Marital status		
Married	.106 (0.087)	-.124 (0.086)
Separated/Divorced	.138 (0.114)	.211* (0.091)
Widowed	.227 (0.237)	-.217 (0.171)
Low Income	-.092*** (0.030)	-.085*** (0.027)
Education	.045 (0.097)	-.029 (0.089)
Poor health	.555*** (0.127)	.170 (0.118)
Constant	-1.324*** (0.202)	-.817*** (0.177)
Statistics		
N	6467	6907
Pseudo R²	0.007	0.008
Chi²	40.94***	55.65***

Significance: + 0.10; * p<.05; **p<.01; *** p<.001
Standard errors of the regression coefficients in parentheses

4.2.3.3 Study of emotional reactions

The results indicated that 15,756 valid responses were recorded for the screening question on the emotional reactions with 13,620 (86.44%) positive replies. The most commonly observed feeling as indicated by the respondents that were emotionally affected was anger (57.92%; n=7,886) followed by annoyance (25.10%; n=3,417) and shock (9.36%; n=1,275). In descending order, the remaining types of emotional reactions as observed by the sample were fear (2.63%; n=358), loss of confidence/feeling vulnerable (2.18%; n=297), anxiety/panic attacks (0.74%; n=101), depression (0.60%; n=82), difficulty sleeping (0.35%; n=48) and crying/tears (0.26%; n=35). The remaining responses were recorded as 'other' (0.85%; n=116) and no double entries were allowed in the coding of these results. The recorded degree of overall emotional affection was recorded as *'affected a little'* (50.56%; n=6,885), *'quite a lot'* (30.12%; n=4,102) and *'very much'* (19.32%; n=2,631).

4.2.3.3.1 Explanatory factor analysis

Cronbach's alphas reported moderate reliability with an average value of 0.66 for the scale reliability coefficient both for standardised and non-standardised items. The KMO measure of

sampling adequacy was .82, well above the value of 0.5 which is typically recommended for a satisfactory factor analysis to proceed.[44] The Bartlett's test for sphericity was significant ($\chi^2(47) = 16086.16$, $p < .05$) indicating that the correlation matrix was not an identity matrix. Finally, the all communalities exceeded the value of .3, yet showing that all items shared some common variance with each other with one exception ('other' factor; see Table 4:8). The indicators outlined above were suggestive of including all 10 items in the analysis while considering the higher uniqueness scores on the result's interpretation.

The initial eigenvalues showed that the first three factors explained 27.57%, 11.88% and 10.52% of the total variance respectively. The remaining factors (four to ten) accounted for less of the 9% of the variance and had eigenvalues less than one over one. Figure 4:1 illustrates the fraction of total variance in the data as explained by each extracted factor. The curve clearly distinguishes the so-called 'elbow' point of separation in the fraction of total variance that denotes the conclusion of the contribution of the most influential factors and the onset of the least important ones. In this case, the curve begins to flatten between factors 2 and 3 which was expected given that all factors after 3 have eigenvalues less than 1, suggestive of a 3-factor solution.

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[44] Generally, a value for the KMO measure that exceeds .80 merits the application of factor analysis.
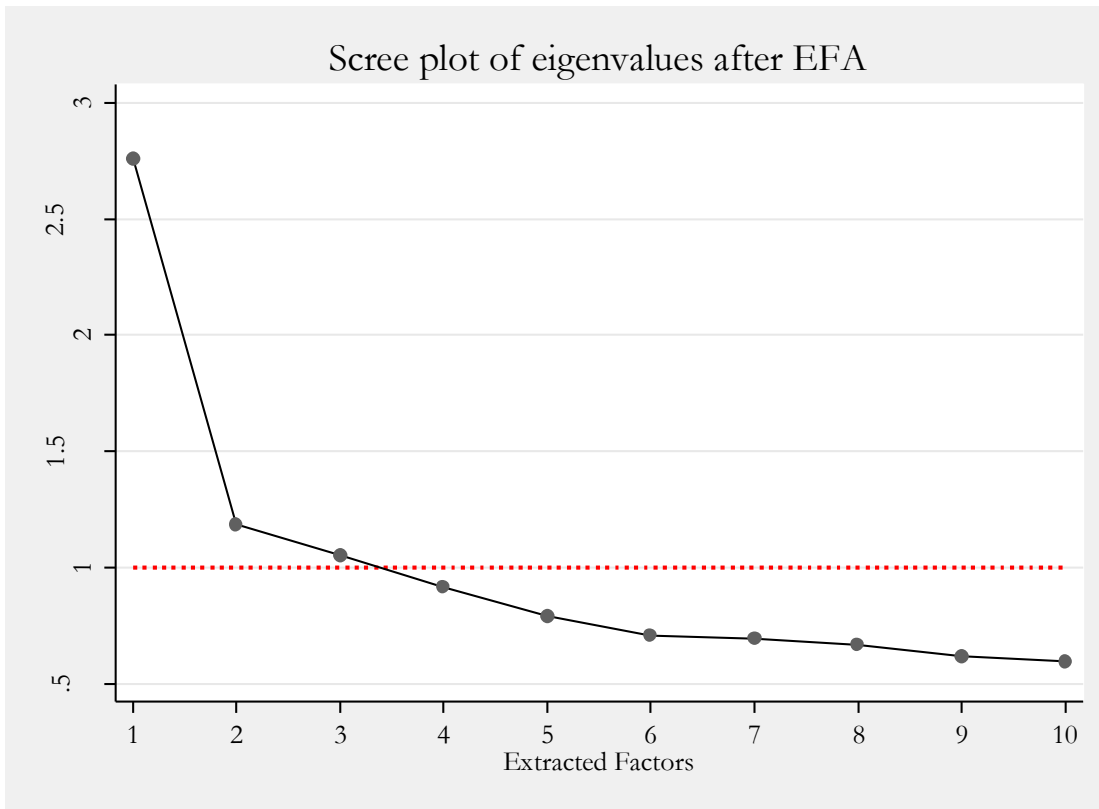
Figure 4:1 Scree plot of the eigenvalues against all extracted factors illustrating the 'elbow' point of separation in the fraction of total variance.

Considering the Kaiser criterion that suggests retaining those factors with eigenvalues equal or higher than 1, the insufficient number of primary loadings, the 'flattening' of the curve of the eigenvalues after Factor 3 (illustrated in Figure 4:1) and the difficulty in interpreting the remaining factors, the three factor solution was preferred with 49.97% cumulative variance. The factor-loading matrix for this final solution is presented in Table 4:8.

Table 4:8 Rotated factor loadings and communalities based on a principle component factors method with oblimin rotation for 10 emotional reaction items (n=13,620)

Item	Factor1	Factor2	Factor3	Uniqueness
Anger		0.78	-0.28	0.32
Shock	0.43	0.22		0.74
Fear	0.65			0.57
Depression	-0.62			0.62
Anxiety/panic attacks	0.68			0.55

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	Factor 1	Factor 2	Factor 3	
Loss of confidence/feeling vulnerable	-0.63			0.60
Difficulty sleeping	-0.69			0.53
Crying/tears	0.62			0.62
Annoyance		-0.74	-0.33	0.33
Other			0.93	0.14

Note. Factor loadings < .2 are suppressed

Regarding the interpretation of these results, the factor loadings inform about the resulting weights and correlations between each of the emotional variables and the factor. Higher loadings indicate greater effect of the variable in defining the factor's dimensionality. The items 'Fear', 'Depression', 'Anxiety/panic attacks', 'Loss of confidence/feeling vulnerable', 'Difficulty sleeping' and 'Crying/tears' had factor loadings over .6 in Factor 1. The item 'Shock' had lower loadings, between .4 and .2 on both Factors 1 and 2, whereas items 'Anger' and 'Annoyance' had significant loadings only in Factor 2. Factor 3 mainly represented the 'Other' item with a low contribution from the 'Anger' item.

These results clearly identify the main contribution of the items involved in the factor structure, hence providing a direct interpretation of the extracted factors based on the relevance of each item in their structure. Drawing from the contribution of its underlying items, Factor 1 was labelled *'Serious emotional reaction'* since the items with higher loadings were primarily describing a significant psychological impact. Similarly, Factor 2 was labelled *'Moderate emotional reaction'* as its interpretation was driven primarily by the items 'Anger' and 'Annoyance' both with loading over .7. The item 'other' had the greatest effect on Factor 3. Considering that items denoting more severe emotional reactions assessed did not influence the structure of the factor, Factor 3 was labelled *'Minor emotional reaction'*[45] The insufficiency of explicit data on the item describing other emotional reaction did not allow for further conclusions on the interpretation of this factor. To verify this three factor solution and substantiate its interpretation, confirmatory factor analysis was used.

4.2.3.3.2 Confirmatory factor analysis

CFA indicated that a two-factor rather than the EFA three-factor model was better fit for the data. Following EFA, the postulated model specified two latent variables (also referred to as common factors); the 'serious' and 'less serious' emotional reaction. They are represented by circles

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[45] The label 'Impulsive emotional reaction' was also considered.

in the output path diagram and can point to more than one observed variable (indicators). In Figure 4:2, the 'serious emotional reaction' causes three observed variables (indicators: *depresz, panicz, cryingz, difslez, confidz*) and the 'less serious emotional reaction' influences six (indicators: *cryingz, difslez, confidz, shockz, angerz, fearz*).

The small circles incorporate all the variance in each manifest variable (e.g. measurement error) which is not captured by the common factors (Albright & Park 2009) and are commonly referred to as error terms. Error terms are typically assigned to each of the indicators (e1, e2...e8) and because they affect only a single observed variable, they represent unique factors (Albright & Park 2009). The measured variables are illustrated in the rectangles (see Figure 4:2) and denote Depression, Anxiety/panic attacks, Crying/tears, Difficulty sleeping, Loss of confidence/feeling vulnerable as caused by *seriousemoreac* and Crying/tears, Difficulty sleeping, Loss of confidence/feeling, Shock, Anger, Fear by *lesseremoreac*. There were three cross loading in this model (*cryingz, difslez, confidz*; see Figure 4:2). The two-headed arrow between the two latent variables indicates that the common factors can be correlated. The single headed arrows imply a direction of assumed causal influence by pointing away from the circles and towards the manifest variables (Albright & Park 2009). The numerical figures alongside each shape denote the corresponding factor loadings; .71 is, for example, the effect (regression slope) of *seriousemoreac* on *cryingz* (Crying/tears). The squared factor loadings are referred to as "*a communality representing the proportion of variance in the ith observed variable that is explained by the jth latent variable*" (Brown 2006, p. 61 in Albright & Park 2009, p. 4). Consequently, the R^2 for *cryingz* is .50 (=.71^2); for *difslez* it is .85 (=.92^2); for *confidz* it is .25 (=.50^2) etc., indicative of good fit. Figure 4:2 illustrates the process underlying the resulting model and the notation discussed so far.
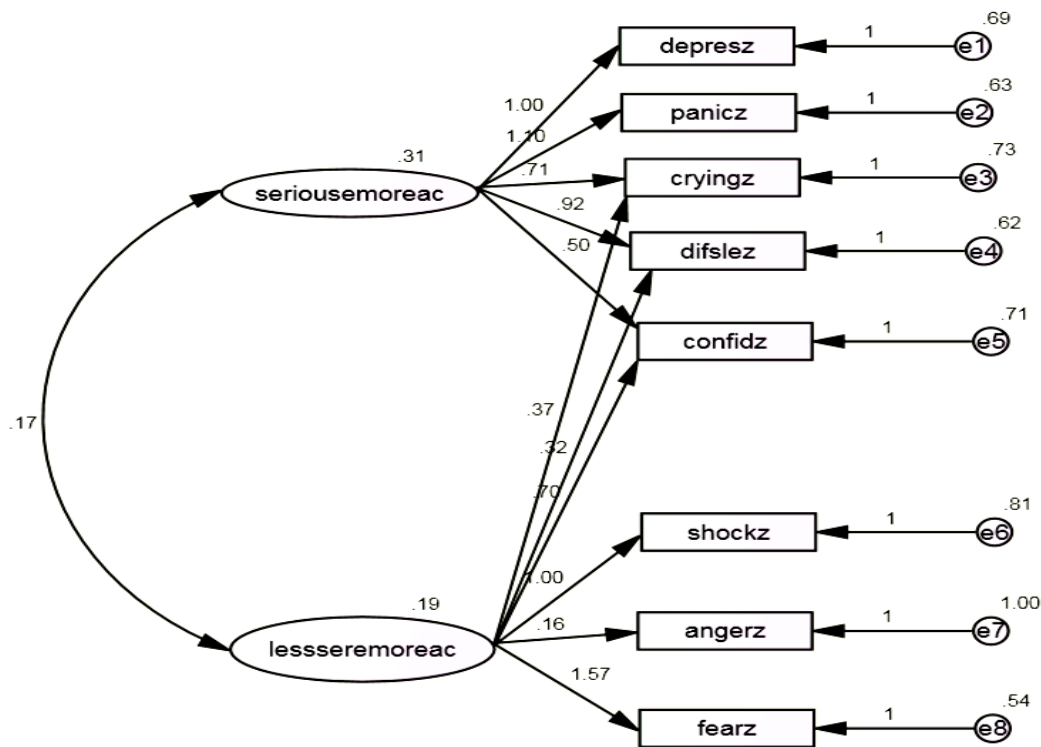
Figure 4:2 Path diagram representing the CFA measurement model for the data on emotional reactions to victimisation

Regarding the predictive fit of the model, the chi-square test demonstrated a large and significant value ($\chi^2(16)=229.67$, p-value<.05), indicating that there is significant difference between the observed and expected covariate matrices. The resulting chi-squared value (CMIN) also influenced the CMIN/DF indicator, which is the chi-square divided by the degrees of freedom (DF) value. Based on the recommendations for the low chi-squared statistic, this index would ideally be less than two. Although such a result suggests rejecting the null hypothesis of good fit, the chi-square test is only indicative and cannot be regarded without consulting the rest of the fit statistics. In addition, such large chi-squared values are commonly observed in the large sample sizes and can be explained as simply having too much power (Hair et al. 2009). The values for the Akaike Information Criterion (AIC), the Browne-Cudeck criterion (BCC), the Bayes information criterion (BIC) and the Consistent AIC (CAIC) were *269.68*, *269.71*, *420.06* and *440.06* respectively; indicating quite

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moderate predictive fit but yet better than the rest of the assessed models. Generally, the smaller value for these metrics the better the fit is when comparing models (Schreiber et al. 2006). The lack of commonly accepted threshold for these statistics, the fact that they are not used to assess the fit of a single model and that these values were smaller than the rest of the model justifies the final selection of the current model.

In terms of comparative fit, which is judged by comparing the relevant indicators either to a baseline (independent model) or to those of another model, the general rule for accepting the model is obtaining statistics above .95 for all indexes. This criterion was satisfied in this analysis as the Comparative Fit Index (CFI) was *.986,* indicative of a good fit and better than models previously assessed. CFI ranges from 0 to 1 with a larger value (typically ≥ .90) indicating better model fit (Hu & Bentler 1999). Similarly, the values for the Normed Fit Index (NFI), the Relative noncentrality Fit Index (RNI), the Incremental Fit Index (IFI) and the Tucker-Lewis Index (TLI) were *.98*, *.97*, *.99* and *.98* respectively, suggesting good comparative fit.

To assess the parsimonious fit of the model, the Parsimony-adjusted Goodness-of-Fit Index (PGFI) was used. The obtained value (.44) suggests that the model was not optimally parsimonious given that the parsimony criterion invites values closer to one. However, the obtained PGFI was deemed adequate considering the sensitivity of this index to the model size (Schreiber et al. 2006).

Concerning the general fit of the model to the data, the Root Mean Square Error of Approximation (RMSEA) fit statistic of *.031* was indicative of a good fit. The values of the RMSEA statistic range from 0 to 1 with smaller values implying better model fit. Hu and Bentler (1999) suggest that the RMSEA value should never exceed .06 for a model fit to be acceptable. This further reinforces the fit of the model based on the calculated 95% confidence intervals (CIs) for the RMSEA (see Table 4:9). Furthermore, the PCLOSE, used to test the statistical significance of RMSEA, was not significant. This finding suggests that the theoretic model is not significantly different from the actual relationships among variables (Hair et al. 2009), hence providing further evidence for the design of the model. The Root Mean-square Residual (RMR) was adequately low with a value of .017. As a rule, the smaller RMR value the better, with 0 indicative of perfect fit (Schreiber et al. 2006). The model's Goodness-of-fit index (GFI) and Adjusted GFI (AGFI) was *.996* and *.990* respectively, indicating an acceptable fit.

Table 4:9 Summary of Goodness of Fit Statistics for the CFA model

Absolute/predictive fit (Smaller the better: for model comparison only)				
AIC	*BCC*	*BIC*	*CAIC*	
269.678	269.705	420.064	440.064	
NPAR	*CMIN*	*DF*	*P*	*CMIN/DF*
20	229.678	16	.000	14.355

Comparative fit (Comparison to a baseline or other model: $\geq$ .95)				
NFI $_{Delta1}$	*RFI* $_{rho1}$	*IFI* $_{Delta2}$	*TLI* $_{rho2}$	*CFI*
.984	.973	.986	.975	.986

General fit				
RMSEA	*RAMSEA CIs*		*PCLOSE*	
	LO 95	*HI 95*		
.031	.028	.035	1.000	
RMR	*GFI*	*AGFI*	*PGFI*	
.017	.996	.990	.443	

This analysis concluded that two dimensions underlie the emotional responses to victimisation. The two-factor model suggested here followed the structure of the EFA model, and the interpretation of the underlying dimensions was concurrent with that of the EFA extracted factors. The latent variable '*seriousemoreac'* had significant causal influence on the manifest variables denoting Depression, Anxiety/panic attacks, Crying/tears, Difficulty sleeping, Loss of confidence/feeling vulnerable as demonstrated by their respective factor loading (regression weights). The latent variable named '*lessseremoreac'* had significant causal influence on the items representing Shock, Fear and Loss of confidence/feeling and less strong influence on the variables describing Anger, Difficulty sleeping and Crying/tears. Considering the overall fit indicators, the final model provided a reasonable fit to the data. Despite the model was not optimally parsimonious, the general fit indicators were sufficient to accept this model for the purpose of this research. Further refinement of the model can always be achieved as the CFA process is indicative and not conclusive.

4.2.3.4 Study of seriousness of crime ratings

WMW and KW tests results suggested that respondents with good health and education qualification reported higher seriousness scores (z=-9.46, p<.001). There was no statistically significant difference between the seriousness scores of males and females, but older people ranked

higher in terms of seriousness scores ($\chi^2(80)= 140.45$, p<.001). Widowed respondents were found to report significantly higher seriousness scores ($\chi^2(3)= 88.97$, p<.001). Significantly higher scores of seriousness were reported by respondents whose quality of life was affected by crime ($\chi^2(9)= 165.82$, p<.001) and FoC ($\chi^2(9)= 138.49$, p<.001). Respondents generally affected by the specific crime reported higher seriousness scores ($\chi^2(3)= 2785.19$, p<.001) and similar result was observed with the seriousness scores obtained by respondents that were emotionally affected by the described crime (z=-15.37, p<.001).

Victims of crime reported to the police ranked significantly higher (z=-6.14, p<.001) and victims of a single incident were also found to report higher seriousness scores compared to repeat victims (z= 4.49, p<.001). Respondents' scores were higher if the assailant was carrying a weapon (z= 11.98, p<.001), if they knew the assailant (z= -5.12, p<.001) but no significant difference was found if they were alone when the incident took place. In case of theft, the total replacement value of the stolen good significantly affected the seriousness score ($\chi^2(2)= 886.79$, p<.001) with higher rankings observed in the incidents where the overall replacement value did not exceed £1,000. The difference between the underlying distributions of the seriousness scores of respondents that were threatened was statistically significant (z=-16.10, p<.001). Higher seriousness scores were observed from respondents that were injured (z= -20.31, p<.001) and required medical assistance (z= -16.82, p<.001) and from those that consumed alcohol just before the incident (z=2.59, p<.05). Higher scores were also reported from respondents that required time off to recover from any type of injury (z= -19.87, p<.001). Table 4:10 presents a description of the variables that were used in this assessment (also see Tables 4:1-4:3).

Table 4:10 Description of variables in the study of seriousness of crime ratings

Variable	Description	
EverVict	=1 if incident reported to the police (n= 7,307)	(dummy: n_{tot}=12,939)
Weapon	=1 if assailant had a weapon (n=478)	(dummy: n_{tot}=5,841)
Doct	=1 if victim required medical assistance (n=234)	(dummy: n_{tot}=16,835)
Alcche	=1 if victim consumed alcohol before the incident (n=822)	(dummy: n_{tot}=3,552)
Accomp	=1 if victim was accompanied (n=1,949)	(dummy: n_{tot}=4,741)
KnewOff	=1 if victim knew the assailant (n=1,743)	(dummy: n_{tot}=3,272)
TimeOff	=1 1 if victim took time off to recover (n=779)	(dummy: n_{tot}=15,755)
EmotReac	=1 if victim had any emotional reaction (n=13,620)	(dummy: n_{tot}=15,756)

SerEmoReac	Scores for Factor 1 resulting EFA	(interval: n_{tot}=13,620)
TotAff	=1 if victim not affected in any way (n=2,136)	(ordinal) 2=Affected a little (n=6,885) 3=Affected quite a lot (n=4,102) 4=Affected very much(n=2,631)
QualCrim	How much victims' quality of life was affected by crime	(ordinal) Scale from 1 to 10 with ascending importance (n_{tot}=6,471)
QualFear	How much victims' quality of life was affected by fear of crime	(ordinal) Scale from 1 to 10 with ascending importance (n_{tot}=6,252)
Tvalue	=1 if total replacement value of stolen good ≤£100 (n=3,565)	(ordinal) 2= Replacement value < £1000 (n=2,147) 3=Replacement value ≥£1000=3 (n=317)

The results outlined above indicated that the use of violence and its intensity (weapon, injury, threat, time off) combined with the general and emotional effect on victims' life (total affection, quality of life indicators) influenced the seriousness score. Drawing from these results, *ologit* regression was then carried out using the variables that were significant as predictors on the seriousness of crime ratings.

Table 4:11 Ordered logistic regression models on seriousness of crime ratings (v: scorcrm2) in the 08/09 BCS core sample (VF section only)

Variables	Model C1	Model C2	Model C3
Age	.003** (0.001)	.001 (0.001)	.010*** (0.003)
Poor Health	.501*** (0.058)	.108+ (0.064)	.088 (0.145)
Education	.403*** (0.038)	.278*** (0.043)	.171 (0.105)
Total Affection		.850*** (0.023)	.804*** (0.059)
Time off required		.607*** (0.069)	.383* (0.168)
Serious emotional reaction		.393*** (0.018)	.272*** (0.038)
Offender known			-.018 (0.084)
Use of force/violence			.235** (0.081)
Injury			.159 (0.119)
Statistics			
N	15913	13025	1959
Pseudo R²	0.030	0.053	0.054
Chi²	207.618***	3363.657***	536.833***
AIC	4.839	4.621	4.812

Significance: + 0.10; * p<.05; **p<.01; *** p<.001
Standard errors of the regression coefficients in parentheses

	Estimation sample characteristics		
	Mean (SD)		
Age	41.938 (16.003)	42.328 (15.873)	41.175 (13.825)
Poor Health	.065 (0.246)	.067 (0.249)	.091 (0.288)
Education	1.179 (0.384)	1.177 (0.381)	1.164 (0.370)
Total Affection		3.313 (0.775)	3.112 (0.794)
Time off required		3.859 (0.612)	3.811 (0.714)
Offender known			1.390 (0.499)
Use of force/violence			.432 (0.815)
Injury			.179 (0.591)

Table 4:11 shows that the variables kept their signs throughout the analyses but not their significance. In the final model, being older increase the likelihood of providing higher seriousness scores. Similarly, respondents who indicated that they were affected by the described crime were more likely to report higher seriousness score category while the other variables in the model are held constant. Serious emotional reaction was a significant predictor of higher scores of crime seriousness, as the ordered log-odds estimate was significant and positive for a one-unit increase in the emotional reaction score on the expected seriousness score. The ordered logit for respondents that took time off to recover from the incident in a higher score category was significantly higher compare to those that did not holding all other variables constant. However, being injured did not reveal any significant relationship. The use of force was also significant at the 0.01 level of significance, indicating that if a respondent reported a more violent type of used force, his ordered log-odds of being in a higher score category would increase by 0.235 ceteris paribus.

The inclusion of endogenous variables in Models C2 and C3 was assessed through the Smith (1987) likelihood ratio for exogeneity. The likelihood ratio for the suspected endogenous variables in Model C2 was statistically significant (test-statistic=2650.18; p<.001) and not significant (test-statistic=.0001774; p= .989) for Model C3. Thus, the null hypothesis of exogeneity could be rejected for Model C2 but the test failed to reject the null hypothesis of exogeneity of the variables added to Model C3. Thus, the variables on injury, use of force and known offender should be treated as exogenous covariates.

Overall, the regression results confirmed prior expectations and indicated that age and the severity of the effect on the respondent (including emotional response, taking time off to recover and

severity of fore employed) were significant indicators of higher seriousness score. Notably, the total number of observations in each model decreased with the inclusion of more offence specific variables, due to the categorisation in the in the VF section of the BCS (follow-up questions instead of universal). However, the fit indicators demonstrated a moderate fit to the data and all models were statistically significant at the 0.001 level of significance.

4.2.3.5 Study of serious emotional reaction

The final step of the analysis used the results of the investigation so far to study the emotional reaction outcome and the results are summarised in Table 4:12.

Table 4:12 The regression models on serious emotional reaction to violent victimisation in the sample from the VF section of the 08/09 BCS

Variables	Final Model 1 OLS Regression	Final Model 2	Final Model 3
		Logistic Regression	
	EFA Factor 1	**CFA Dimension 1** *incl. cross loadings*	*exc. cross loadings*
Force used	.139** (0.043)	.053 (0.151)	.184+ (0.110)
Number of received injuries			
Total one	.067 (0.091)	.312 (0.311)	.350 (0.215)
Total two	.361** (0.131)	1.559** (0.480)	1.030** (0.382)
Total three	.556** (0.174)	2.656** (0.885)	2.107** (0.754)
Total four	1.269*** (0.294)	2.604* (1.173)	1.613* (1.072)
Total five	2.668*** (0.506)	-	-
Total six	1.227 (0.869)	-	-
Total seven or more	3.685** (1.224)	-	-
Alcohol consumption (victim)	-.204* (0.087)	-.246 (0.322)	-.048 (0.227)
Poor health	.444** (0.156)	1.457* (0.610)	.889 (0.558)
Gender (male)	-.719*** (0.084)	-1.122*** (0.279)	-.921*** (0.207)
Age (years)	.005 (0.004)	.022 (0.014)	.010 (0.010)
Marital status			
Married	-0.036 (0.121)	-.310 (0.379)	-.628* (0.273)
Divorced/Separated	.245* (0.119)	.473 (0.383)	.140 (0.319)
Widowed	-.326 (0.366)	-.391 (1.030)	-.562 (0.785)
Education	-.066 (0.113)	-.373 (0.348)	-.633* (0.259)
Household income			
£15,000-£19,999 p.a.	-.121 (0.139)	-1.191* (0.463)	-.747* (0.347)
£20,000-£29,999 p.a.	-.212+ (0.117)	-1.289*** (0.384)	-.639* (0.285)
£30,000 p.a. or more	-.306** (0.106)	-1.134** (0.359)	-.512+ (0.268)
Constant	.534** (0.197)	.518 (0.620)	2.307*** (0.479)

Statistics			
N	987	337	802
R²	0.235		
Adjusted R²	0.220		
Root MSE	1.21		
F-statistic	15.67***		
Log likelihood		-173.352	-350.501
Pseudo R²		0.255	0.116
Chi²		118.91**	92.13***

Significance: + 0.10; * p<.05; **p<.01; *** p<.001
Standard errors of the regression coefficients in parentheses

	Estimation sample characteristics		
	Mean (SD)		
Force used	1.439 (1.032)	1.451 (1.157)	1.446 (1.064)
Number of received injuries			
Total one	.351 (0.477)	.309 (0.463)	.348 (0.477)
Total two	.125 (0.330)	.134 (0.341)	.125 (0.331)
Total three	.066 (0.248)	.062 (0.242)	.069 (0.255)
Total four	.020 (0.141)	.036 (0.186)	.025 (0.156)
Total five	.006 (0.078)	-	-
Total six	.002 (0.045)	-	-
Total seven or more	.001 (0.032)	-	-
Alcohol consumption (victim)	.331 (0.471)	.276 (0.448)	.302 (0.459)
Poor health	.078 (0.268)	.098 (0.298)	.069 (0.255)
Gender (male)	.574 (0.495)	.543 (0.499)	.521 (0.499)
Age (years)	34.096 (12.759)	36.080 (12.274)	34.717 (12.798)
Marital status			
Married	.199 (0.399)	.243 (0.429)	.212 (0.409)
Divorced/Separated	.206 (0.404)	.243 (0.429)	.223 (.417)
Widowed	.014 (0.118)	.021 (0.143)	.016 (0.126)
Education	1.158 (0.360)	1.219 (0.415)	1.175 (0.379)
Household income			
£15,000-£19,999 p.a.	.103 (0.305)	.109 (0.313)	.099 (0.299)
£20,000-£29,999 p.a.	.175 (0.380)	.184 (0.388)	.187 (0.390)
£30,000 p.a. or more	.352 (0.478)	.299 (0.458)	.327 (0.469)

4.3 Exploring injury characteristics: An Accident & Emergency Perspective

This study will use data collected in the Cardiff's Emergency Department to investigate injury characteristics resulting in non-fatal assaults. The original sample was made up of all assault patients (n= 50,893) who attended the ED of the University Hospital of Wales (UHW), Cardiff between January 1st 2000 and August 31st 2010. The aim of this research was to assess injury characteristics, classify injury locations according to their prevalence in victims of crime, and categorise them accordingly in a manner consistent with the findings from the previous chapter. The dataset, referred to as the Accident and Emergency (A&E) data, was deemed suitable as to its relevance in providing a detailed description of the physical location of injuries.

Recorded emergency department data can be used to measure the incidence of violent crime in the area covered by each A&E department and to identify groups at increased risk of victimisation, providing a new look into the origin of violence in a community. Sivarajasingam (2001) showed that ED records reliably reflect the incidence of violence while Sutherland and Shepherd (2002) acknowledged the suitability of ED data as a source for analysing rates of violent injury within a specific catchment area. In this direction, an additional use of such data is to identify trends in violence along with demographic and incident-specific predictors (violence "hotspots") of serious non-fatal violent injury within the ED catchment area and advise public protection organisations such as the police (Warburton & Shepherd 2004). This feature could significantly affect the provision of public health resources, policy decision-making, and criminal justice with regard to violence prevention, while it can be used as a method to allocate health resources in the prevention of assault-related injury. A similarity with the BCS is that ED data can also capture incidents of violence that are not reported to the police ("Dark Figure" in Blackburn (1993), see Chapter 2) and thus, can be used as an alternative means to construct violence rates (Shepherd, Sivarajasingam & Rivara 2000).

Numerous studies cite ED data in their sample; Sivarajasingam *et al.* (2008) used a sample of 49 EDs and Walk-in Centres in England and Wales and identified a 6.6% decrease in the incidence of serious violence between 2008 and 2007 by analysing the violence-related ED attendances. Povey et al. (2009) used a sample population of 11,257 ED attendees at the UHW, to assess whether the Manchester Triage Scale (MTS) could be used as a proxy for the cost of treatment for facial injury

with positive results. Brennan, Moore and Shepherd (2006) used ED data to assess the consequences of weapon violence regarding injury and found that violence involving weapons was more likely to result in more serious injury compared to other violence, corroborating with previous evidence (Felson & Messner 1996).

Despite their benefits, the A&E data have some inherent weaknesses that might affect the study of violence rates. As will all large scale datasets, they suffer from coding and recording errors (e.g. missing data, response errors, inaccuracies in recorded data) and cannot capture instances where victims of assault did not get medical assistance by choice or not, as for example due to limited access to the ED (Lyons et al. 1995) or fatal injuries. However, their benefits outweigh their shortcomings, as A&E records provide an invaluable source for the study of violence.

4.3.1 Research questions

The research questions for this investigation were as follows:

- o What are the types of injury most prevalent in victims of assault?

- o Can these be classified in manner consistent to their anatomical location? If so, how does such a classification corroborate with severity measures?

- o Aside MTS, what alternative measures of severity can be used and how do they compare to the MTS?

4.3.2 Methodology

This research used anonymised data drawn from the Patient Administration System (PAS) of the Cardiff and Vale NHS Trust. Any information that could be used to identify the patients (e.g. names, addresses) was removed prior obtaining approval for use for confidentiality purposes. From the information recorded during the reception process in the ED, only a certain number of variables were included in the obtained dataset, limiting the dataset to A&E patients registered as assault victims (i.e. treatments categorised as cases of assault). These data included chronological details, general characteristics of the sample such as arrival mode, type of disposal but primarily described

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offence, injury and assault related characteristics. It should be noted that the dataset did not contain the number of injuries; hence, only one type of injury was assigned per individual without rejecting the possibility that more injuries could have been sustained. In case of a patient presenting with more than one injury, only the most serious one is recorded. The project was identified as an audit and did not require ethical review under the terms of the Governance Arrangements for Research Ethics Committees (REC) in the UK.

4.3.2.1 Data and sample

A&E data have been submitted from local NHS providers' Patient Administration Systems (PAS), via the Secondary Uses Service[46] (SUS). PAS is a computerised system used by reception staff at the A&E departments that stores all the admission records. These typically record the time and date of patients' arrival and departure, doctor's conclusion and assessment, along with other information acquired from the patients regarding their identification (including gender, age and other demographics), the type of assault they suffered, the number of assailants and the location, the time and date of the assault.

The current practice for patients' registration upon their arrival at A&E involves the collection of information (recorded through the PAS) that include patients' description of the incident (accident, assault etc.) along with details on the severity and the type of injury. Patients are firstly examined by a triage nurse at a private triage station in the Emergency Department (ED), where according to the Manchester Triage Scale (MTS: Manchester Triage Group 1997; Marsden & Windle 2006) guidelines they are assigned a triage score that represents patients' level of pain/discomfort. The aim of the triage assessment is to ensure that patients in the ED are treated according to the order of their clinical urgency[47]. The MTS is a five-point triage scale, with each point denoting a maximum waiting time prior to treatment. The triage score is calculated by the means of a structured assessment tool where a rating of one indicates that the patient should be treated immediately, while a rating of five indicates that the patient's need for treatment is not urgent and that they should be treated within four hours. Appendix 1 (§1.2) presents a brief description of the MTS, the five priority categories of the MTS and the indicative flow chart underlying nurse's decision on allocating the patient to each

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[46] SUS is a national data warehouse that has been delivered as part of the National Programme for IT.
[47] More specifically, triage information constitutes a proxy for the urgency of need for treatment (Downing & Wilson 2004).

of those categories. Ganley and Gloster (2011) provide a more comprehensive overview of triage within an emergency care setting. Cronin (2003) described a sample process mapping technique as follows: After a patient's arrival and registration to the ED, an emergency attendance card is generated from the available information technology system. This card is queued for the attention of the triage nurse and the patient waits until called for triage. The assessment is done by the nurse, who provides a category (1-5) for the patient and classifies their healthcare need into one of 96 presenting problems (Cronin 2003). It is after that when the patients are assigned to an ED member for treatment (HES Online 2010).

The study fully complied with the Caldicott Principles in terms of confidentiality as the obtained data were anonymised and no identifiable information was used for the purposes of this research. The researcher had no knowledge of the respondents' personal information as all identifiable aspects of patient information were processed within the Trust. The identification process entailed the extraction of specific variables from the available A&E dataset detailing patients' assault-related information. The selected variables were merged in a single STATA data file and aside the injury feature no other inclusion criteria were applied.

4.3.2.2 Analytic strategy

The study employed exploratory data analysis to look for possible errors in the data and to assess features of the dataset that pertained to the objectives of the study. All analyses were conducted using STATA. A number of changes were made to the data prior to the analyses to clean the data and ease the calculations. This involved recoding the data, generating dummy variables, encoding existing ones and checking for multiple entries, missing data and other coding errors caused by manual handling. Once recoding was completed, the dataset was collapsed so that no individual incident was included twice in the analyses. Overall, attendance date and description, triage category, diagnosis, anatomical site and assault site reported for each case of assault were the studied variables in addition to the subject's characteristics. Simple descriptive statistics were used to assess the quantities of interest, information used to categorise the observed types of injuries based on their anatomical site.

To assess the severity of the observed injuries, this study assumed that severity could be approximated by the MTS measure of urgency based on previous evidence (Shepherd, Irish & Scully

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1988; Stallard et al. 2006; Brennan, Moore & Shepherd 2006). However, three drawbacks were identified in using MTS score as a severity indicator. First, the MTS is predominantly a tool for rating the urgency of a patient's need for treatment and hence cannot always reflect accurately injury severity. Although it has been used as a proxy for severity (Shepherd, Irish & Scully 1988; Stallard, Velleman & Baldwin 1998; Stallard et al. 2006), there has not yet been any published evidence that validates MTS as an actual indicator of severity per se. Second, the MTS score fails to capture the victim's perspective of pain and suffering as it does not always correspond to the clinical urgency or to the injury severity. While these may be similar concepts, they are not identical and should be distinguished in later investigations. Third, the MTS score necessitates medical assessment from trained personnel and does not allow its further use for large-scale assault related epidemiological studies (Sivarajasingam 2001; Downing, Cotterill & Wilson 2003).

For these reasons and for a richer description of severity, two additional severity proxies were used. Following Shepherd's (1990) suggestion, the study adopted admission to hospital as a different measure of severity. In addition, this study also assessed the usability of patient's arrival information for constructing an alternative proxy for severity. Assuming that the more urgent and severe cases of injury would imply the call for an ambulance; this study suggested that the arrival by ambulance could also be used as a proxy for severity. To assess the validity of this assumption, ploychoric correlation between arrival by ambulance and the previously validated MTS score was employed. Similarly was done between Shepherd's (1990) purported severity proxy, admission to hospital, and MTS score as a reference point for the study's hypothesised proxy.

Correspondence analysis (CA) was then applied to assess the relationship between the grouped types of injury and each of the three previously mentioned proxies of injury severity. CA is typically used with nominal (categorical) data to display graphically the relationships between the categories of the assessed variables (Lee 1994). It is a geometric visualisation technique that pictures the associations between the levels of a contingency table (i.e. the rows and columns) in a global way (e.g. coordinate plots, biplots, transformation plots etc.) using numerous statistical procedures (descriptive statistics, object scores, discrimination measures, iteration history, correlations of original and transformed variables, category quantifications) (Hoffman & De Leeuw 1992; Meulman & Heiser 2010). The method assigns numerical values (object scores) to all the available elements so

that items within the same category appear close to each other and discriminate against those that are far apart. Typically, the significance of the association between certain levels of two variables in two-way contingency tables is inferred based on an assessment of the cell frequencies in two-way contingency tables (Lee 1994). CA infers the association between these levels of the variables by decomposing the calculated chi-squared statistic into orthogonal factors that maximise the separation between row and column score and displays them as points in a low-dimensional space whose positions are consistent with their associations in the two-way table (Hoffman & De Leeuw 1992; Meulman & Heiser 2010). The goal is to produce a two-dimensional approximation of the distances between row cells and column cells that optimally reflects the hierarchy (i.e. metric scaling, ordination) in their relationships (Weller & Romney 1990). To assess the relationship between the injury severity measures and the obtained groups of injuries, an extension of the CA was used; namely multiple correspondence analysis (MCA), typically applied to analyse the pattern of relationships between three or more categorical dependent variables (Abdi & Valentin 2007).

4.3.3 Results

The dataset comprised a total of 50,893observations, each denoting an individual event. Due to the restricted information on the dataset, age and gender were the only available demographic characteristics, a summary of which is presented in Table 4:13.

Table 4:13 Summary of general characteristics in the A&E sample

	Sample[1] (n_{tot}=50,893)	
Males	37,690	(74.06%)
Age (in years)	27.69	(SD= 12.02)
Registered as assault victims	41,070	(89.69%)
Referral source		
999	16,191	(31.90%)
Referral from elsewhere (e.g. NHS direct, other A&E or hospital, escort referral, GP)	7,596	(14.97%)
Police	3,588	(7.07%)
Work (incl. school/college)	637	(1.25%)
Self	22,739	(44.81%)
Arrival mode		
Ambulance	16,797	(33.05%)
Private	30,556	(60.13%)

Public transport	1,242	(2.44%)
Walking	839	(1.65%)
Other/Unknown	1,383	(2.72%)
MTS category (score/average waiting time in hours)		
Non Urgent (5)	93	(0.20%)
Standard (4)	37,027	(79.96%)
Urgent (3)	8,494	(18.34%)
Very Urgent (2)	593	(1.28%)
Immediate (1)	101	(0.22%)
Type of patient disposal		
Admitted to Hospital (incl. University Hospital of Wales, LLandough & Whitchurch Hospitals)	2,756	(5.43%)
Referred elsewhere (e.g. Plastics/Burns Unit Morriston, Ophthalmology Unit, Trauma Clinic)	135	(0.27%)
Died in the department	11	(0.02%)
Sent home	41,934	(82.59%)
Other (unspecified)	389	(0.77%)
Did not wait	5,549	(10.93%)

[1]Numbers may not add up to total due to missing data; percentages may not add up to total due to rounding

Table 4:14 presents a summary of the assault-specific characteristics in the sample, including the location of the assault, description of the weapon (if weapon was involved), the number of assailants as identified by the patients upon their arrival and the location of injury. Appendix 1 (§1.3) presents a comprehensive list of described injuries and medical diagnosis. This information was used to group the injuries in 4 categories, where the 'unspecified' level includes cases that failed to be registered. Results indicated that a use of weapon was not recorded in all occasions and that the most injuries were located at the head, confirming prior hypothesis.

Table 4:14 Summary of assault-specific characteristics in the A&E sample

	Sample[1] (n_{tot}= 40,756)	
Recorded location of assault	n_{tot}=34,619	
Own home	4,369	(12.62%)
Someone else's home	1,820	(5.26%)
Street	17,253	(49.84%)
Workplace	827	(2.39%)
Bar/Pub	3,160	(9.13%)
Club	3,006	(8.68%)
Other	4,184	(12.09%)
Recorded type of weapon used	n_{tot}=38,343	
Blunt object	3,691	(9.63%)
Sharp object	2,454	(6.40%)
Bottle	357	(0.93%)

Other glass	273	(0.71%)
Knife	398	(1.04%)
Pushed	473	(1.23%)
Feet	2,389	(6.23%)
Fist	19,502	(50.86%)
Head	412	(1.07%)
Other body part	5,258	(13.71%)
Unknown	3,136	(8.18%)
Recorded number of assailants	n_{tot}=38,043	
One	20,482	(53.84%)
Two	4,056	(10.66%)
Three or more	8,781	(23.08%)
Unknown	4,724	(12.42%)
Recorded anatomical site of injuries (grouped)	n_{tot}=39,222	
Head	25,159	(64.15%)
Torso	3,860	(9.84%)
Limbs	9,771	(24.91%)
Unspecified	432	(1.10%)

[1] Numbers may not add up to total due to missing data; percentages may not add up to total due to rounding

4.3.3.1 Injury & severity assessment

Regarding injury severity, the MTS score indicated that 19.84% of the total cases of the injuries required urgent or immediate medical assistance. To assess an alternative proxy for severity, this study assumed that mode of arrival and specifically the use of ambulance could be further used as a proxy for severity. To validate this assumption and use arrival by ambulance as an indicator of injury severity, polychoric correlation was employed between the variables denoting triage (ordinal: 5 scales) and ambulance use (dummy variable, coded as 1 if ambulance was used and 0 otherwise) as a measure of agreement between these two measures. The resulting coefficient (Rho = -.61, S.E. = .01) and the non-significant p-values of the tests of no correlation (Likelihood Ratio $\chi^2(3)$= 1004.6 and Pearson's $G^2(3)$= 270.61; n.s.) suggested a good model fit, verifying the plausibility of the polychoric model assumptions. This indicates that arrival by ambulance is a good proxy of injury severity for this dataset and can be used in further assessments. Figure 4:3 illustrates this relationship, showing that as urgency increases so does the likelihood of arriving with ambulance.
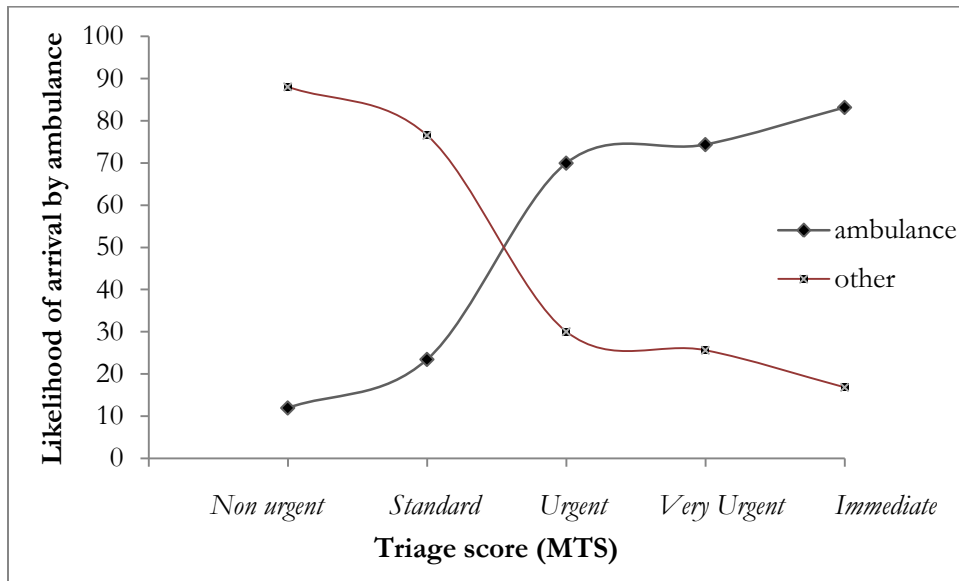
Figure 4:3 Relationship between Triage Category and likelihood of arrival by ambulance

Similarly, the proxy of admission to hospital[48] produced a polychoric coefficient (Rho = -.47, S.E. = .01) with non-significant p-values for the no correlation tests (Likelihood Ratio $\chi^2(3)$= 218.38 and Pearson's $G^2(3)$= 47.47; n.s.); indicators of good model fit. Figure 4:4 shows the relationship between the two proxies and demonstrates how urgency corroborates with admission to hospital as the likelihood of admission increases accordingly to the admission to hospital.

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[48] Previously validated in Brennan (2007, pp. 138-9) with a different dataset.
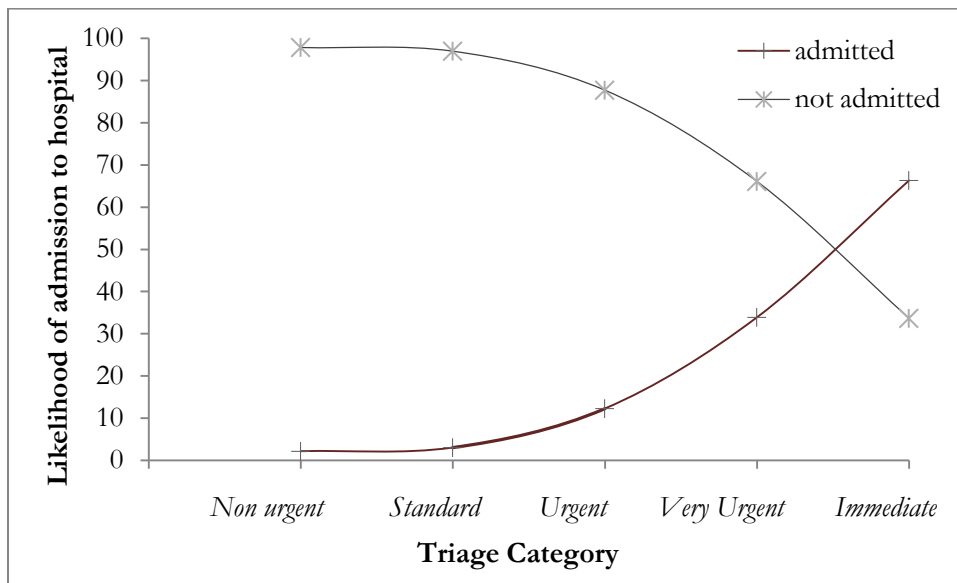
Figure 4:4 Relationship between Triage Category and likelihood of admission to hospital

Correspondence analysis was used as a visual aid to the assessment of consistency between injury location and injury severity. For injury severity, three proxies were used; namely MTS score, admission to hospital and arrival by ambulance. The resulting correspondence maps (biplots) illustrated in Figures 4:5 and 4:6 demonstrate the consistency of the assessed qualities. The plots display two of the dimensions, which emerge from principal components analysis of point distances, and points are displayed in relation to these dimensions. In practice, these plots provide a low-dimensional graphical representation of the cross tabulation between the variables of interest, in essence that is a deterministic trend, as a richer description of the dataset.

On the assessment of the MTS score versus the physical location of recorded injuries, correspondence analysis of these data yields the graphical display shown in Figure 4:5. The results indicated that there was a statistically significant relationship between the anatomical site of injury and the MTS score (Pearson $\chi^2(8) = 529.91$, p<.001). The resulting plot has two sets of points, as indicated by the two types of differently coloured point symbols explained below the graph (see top graph on Figure 4:5: red circle denotes body location and green triangle the MTS score). These points denote each item's coordinates in the cross-tabulation table; in this case there are row points for the body location (head, torso, limbs, unspecified) and column points for the MTS score (levels

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1 to 5). The distance between the row points is a measure of consistency between the row profiles (injury location). Similarly, the distance between column profiles (injury severity) provides a measure of similarity between the quantities measured. Hence, the graph indicates that head injuries in the dataset were more similar to those recorded as unspecified and less close to the remainder of the categories. This finding suggests that the classification of injuries to the head, torso and limbs categories was successful as they are concretely different to each other in the graph. Furthermore, this indicates that the unspecified injuries and head injuries could be collapsed as categories into one, as there is no great difference in their projection distance. The graph also verifies the consistency of the MTS score, as the points not only have a concrete distance between each other but they also appear in order of ascending urgency along Dimension 1. The plot shows the distance between ratings of 5 (non urgent) and ratings of 1(immediate) with the remainder of the points being spread according to the logical explanation of their urgency.

The chi-square test between the mode of arrival versus the physical location of recorded injuries indicated a statistically significant relationship (Pearson $\chi^2(12) = 661.20$, $p<.001$) and the associations are illustrated on the bottom graph of Figure 4:5. The row points for the body location appear as red circles and denote injuries on head, torso, limbs and those unspecified whereas the column points for the mode of arrival appears as blue triangles and correspond to ambulance, private, walking, public transport and unknown.

The relationship between the types of disposal as severity indicator and site of injury was statistically significant (Pearson $\chi^2(12) =127.62$, $p<.001$) and is demonstrated on the top side of Figure 4:6. The column point estimates denote the types of disposal; i.e. admission to hospital, referred elsewhere, died in the department, sent home and unspecified (see Table 4:13). The emerging cluster is depicted with a dot-outlined oval.

The bottom graph on Figure 4:6 illustrates the results of the multiple CA where all variables used in the previous assessments were combined in one coordinate plot. The dot-outlined shapes include the directly observed clusters, whereas the dash-outlined shapes are used to indicate the disparity of the included coordinates rather than being clusters per se.
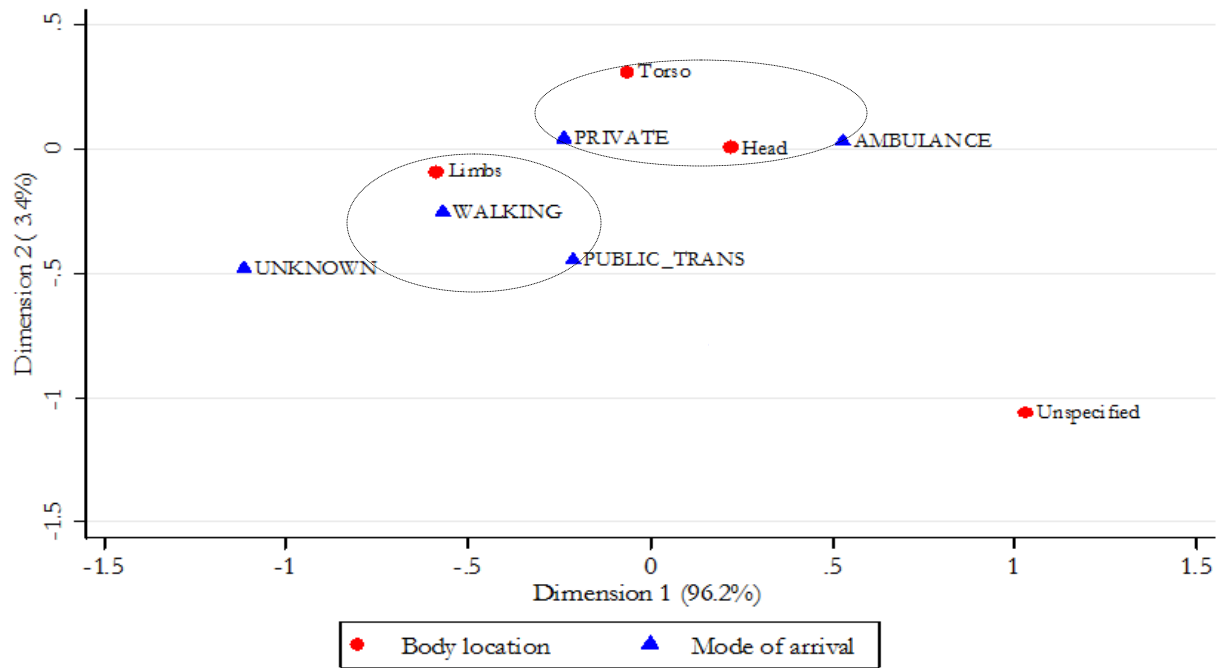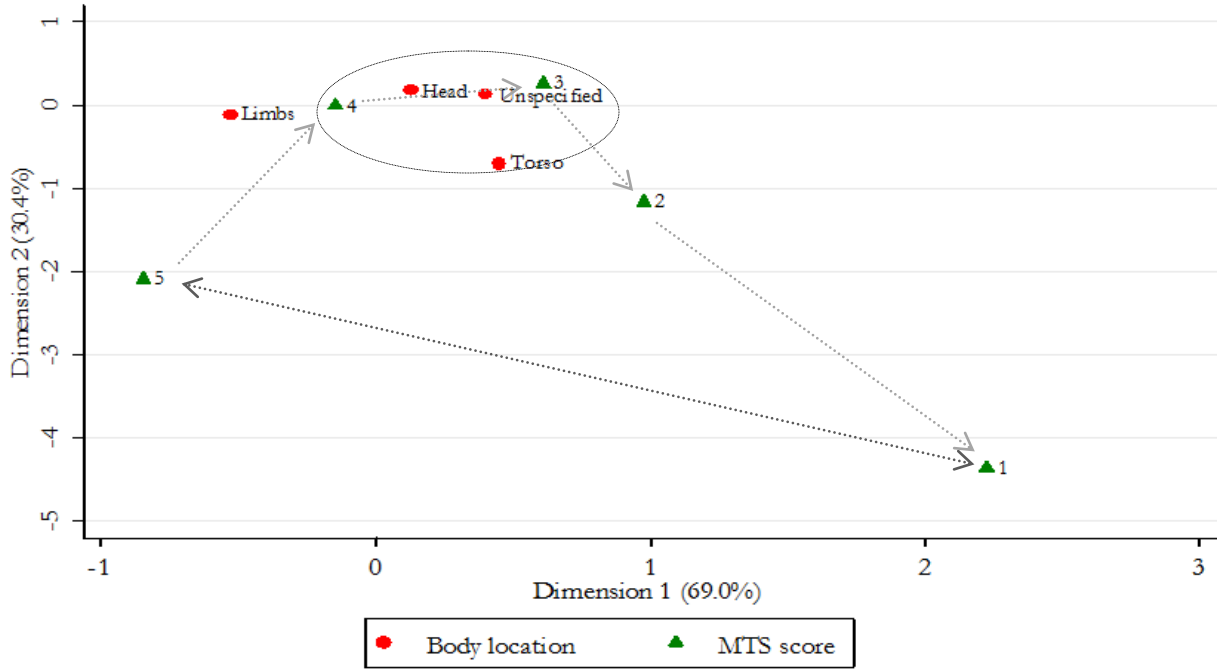
Figure 4:5 Biplots resulting from CA on the body location of injuries to the severity proxies: MTS score (up) and mode of arrival

MCA coordinate plot
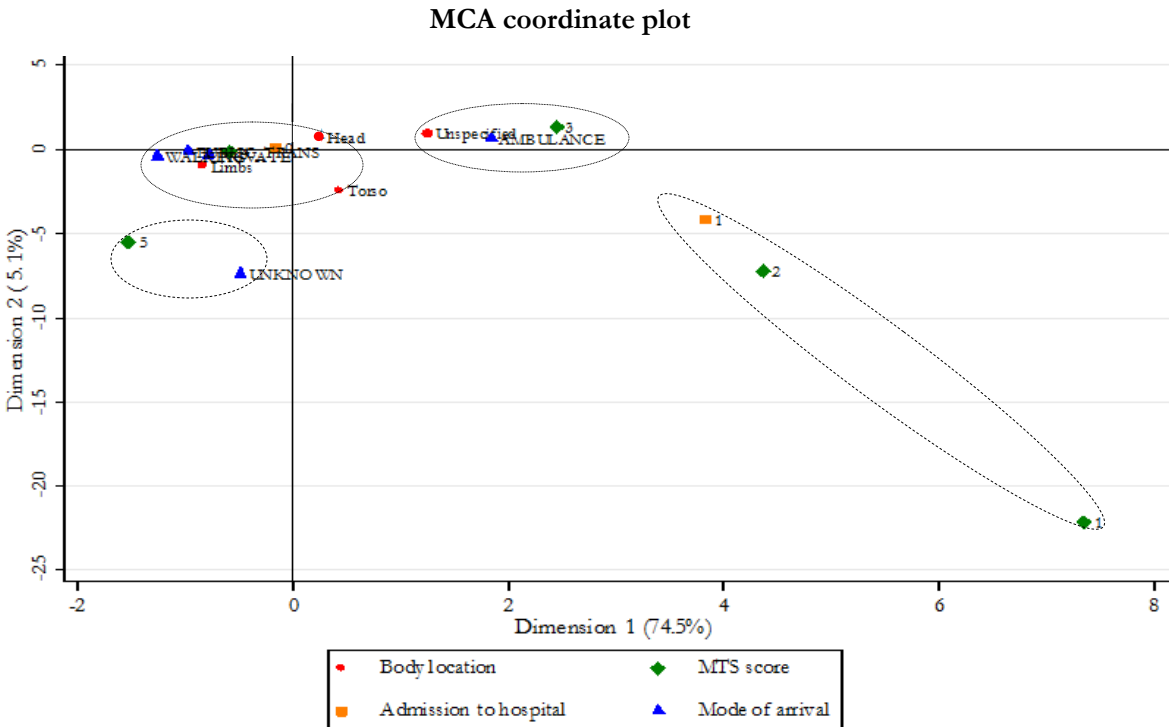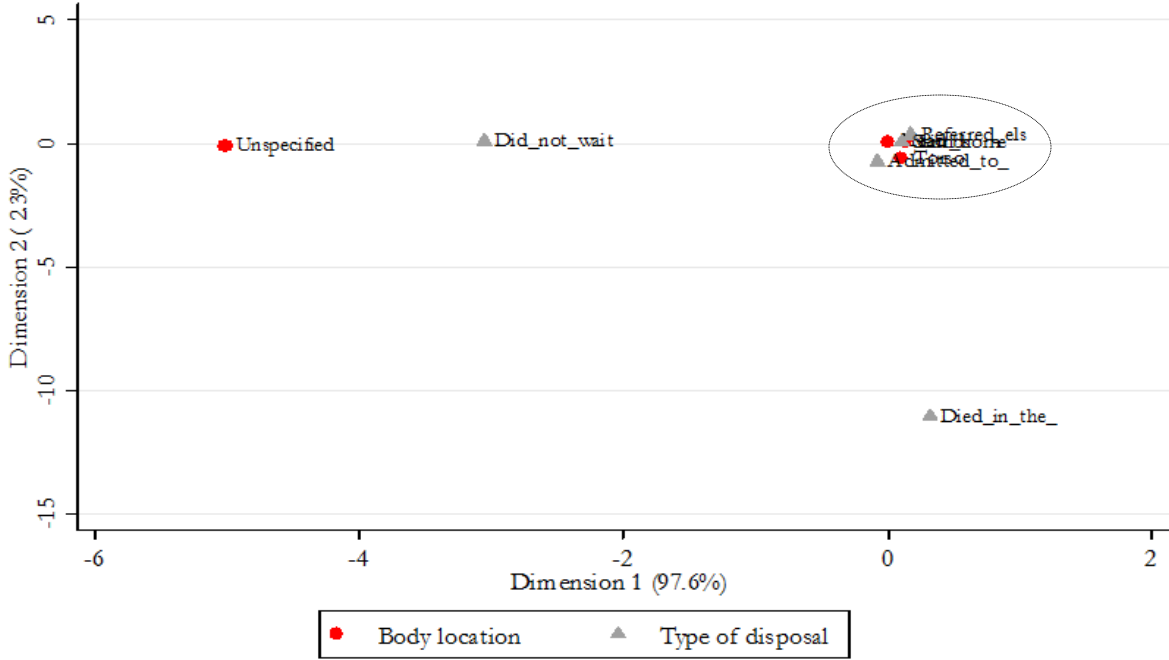
Figure 4:6 Biplot resulting from CA on injury location to the severity proxy of disposal mode (up) and the coordinate plot from multiple CA on all the severity indicators against injury location

4.4 Discussion

The preparatory secondary data analysis set out to investigate the psychological and the physical characteristics of the consequences of violence in victims of assault. The contribution of this investigation to the overall aims of this thesis was twofold. First, the collected epidemiological evidence would direct the design of the survey instrument in terms of suitable questions and valuation scenarios. Since the survey aimed at valuing risk reductions pertaining to victimisation, the preparatory study should capture the specific characteristics prevalent in victims of crime that the survey would need to address. Second, the secondary data results add to the current knowledge on victimisation risks and provide a new insight to the antecedents of violent victimisation with a particular focus to the circumstances resulting from a violent assault from a victim's perspective.

The purpose of 08/09 BCS data analysis was to investigate victimisation characteristics and identify features that could potentially influence the intensity of the emotional response to violent victimisation. It was assumed that an examination of the emotional aftermath of a violent experience would provide an efficient source of information for identifying features that indirectly influence cost valuation, since the characteristics that pertain to such an experience should define the consequent intangible costs.

Results indicated that a number of offence-specific, socio-demographic and behavioural factors were significant predictors of victimisation. Specifically these were age (being younger), gender (being male), marital status (being separated/divorced), lower income (≤ £14,999), lack of educational qualifications, poor health (self-rated) and alcohol consumption. Similar results were reported for repeat victimisation with age (being younger), marital status (being separated/divorced), higher income (≥ £14,999) and poor health (self-rated) being significant predictors of repeat victimisation. Regarding injury characteristics, head was the most injury-susceptible part of the body in a violent victimisation with facial and head injuries comprising 61.75% of the total observed injuries.

In terms of emotional outcomes, BCS provided a series of emotional outcomes for the respondents in the VF section of the survey to describe their emotional reaction to the reported crime incident. Those outcomes were Anger, Shock, Fear, Depression, Anxiety/Panic Attacks, Loss of Confidence/Feeling Vulnerable, Difficulty Sleeping, Crying/Tears, Annoyance and Other. From

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these, anger was the most commonly observed emotional response to the incident of crime (57.92%; n=7,886) followed by annoyance (25.10%; n=3,417) and shock (9.36%; n=1,275).

Factor analyses procedures where then employed to assess whether there is any latent structure underlying the responses on emotional reaction. EFA with principal component factors as an extraction method and oblimin rotation indicated that three distinct factors were underlying emotional reaction responses to the victimisation incident, denoting '*severe*', '*moderate*' and '*minor*' emotional reaction. These factors were interpreted based on the contribution of the items underlying their structure and the description of the PTSD symptoms in the DSM (American Psychiatric Association 2000). Thus, Factor 1 was labelled *'Serious emotional reaction*' since the items with higher loadings were primarily describing a significant psychological impact. Factor 2 was labelled *'Moderate emotional reaction*' as it mainly comprised the items 'Anger' and 'Annoyance' and Factor 3 was labelled *'Minor emotional reaction*' as it did not refer to any of the specific emotional reactions expressed by the 9 items in this assessment. Next, CFA was used to test the EFA three-dimensional solution. Although analysis suggested a two-factor solution, the extracted factors (latent variables) had very similar structure. Specifically, the CFA latent variable '*seriousemoreac*' corroborated with EFA's extracted Factor 1 (*'Serious emotional reaction*') as causal influence was observed with the items denoting Depression, Anxiety/panic attacks, Crying/tears, Difficulty sleeping, Loss of confidence/feeling vulnerable. The second latent variable, '*lessseremoreac*', had significant causal influence on the items representing Shock, Fear and Loss of confidence/feeling and less strong influence on the variables describing Anger, Difficulty sleeping and Crying/tears.

In both solutions, the items reflecting severe emotional reaction were the only psychiatrically diagnosable outcomes in the DSM description of the post-traumatic and acute stress disorder symptomatology (PTSD and ASD respectively; see American Psychiatric Association 2000). The duration[49] and the intensity[50] of these outcomes dictate the diagnosis whilst the chance of developing any of these conditions increases as the severity, duration and physical proximity to the trauma increases. PTSD is generally more severe/long-lasting and termed acute if the duration of the symptoms is less than three months and chronic otherwise. ASD has shorter duration and for a

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[49] The problem must last at least one month for a PTSD diagnosis to be assigned.
[50] The individual's fear, anxiety or other symptoms cause significant distress or/and significant interference in the persons daily life.

diagnosis, the full range of symptoms must be present for at least two days but less than four weeks. Given that duration could not be assessed using the available dataset, it was assumed that the factor describing severe emotional reaction (the first factor in both EFA and CFA) would suggest a longer duration concordant to that of the PTSD diagnosis, whereas the factor describing moderate emotional reaction would imply a shorter duration more suitable to an ASD diagnosis. Such categorisation concords with the description of the most common emotional responding met in the relevant literature (Wong et al. 2007; Wong et al. 2011).

Assuming that greater emotional reaction would yield higher scores of crime seriousness, the next step of the analysis was to identify factors associated with higher seriousness crime ratings in order to investigate characteristics that influence crime seriousness perceptions. The results indicated that seriousness scores varied significantly based on the extent of the emotional affection demonstrated by the respondent and were higher from educated respondents with good (self-rated) health, for crimes reported to the police, for single-time victims, and for victims that required medical assistance and for known assailants. The assessment of the relationship of the variables denoting offence-specific features and individuals' characteristics confirmed prior expectations, indicating that age (being older) and the severity of the effect on the respondent (including emotional response, taking time off to recover and severity of employed force) were significant indicators of higher seriousness score.

Last, the analysis investigated the relationship between offence-specific, socio-demographic and behavioural factors and the severity of the emotional distress. A set of factors that had been identified as victimisation risk predictors were used to build a model that predicted higher emotional stress in victims of violent crime. Results indicated that gender (being female), poor health, the use of violent force, the injury severity (total number of sustained injuries) and low household income were significant predictors of emotional distress while alcohol consumption prior to the incident acted as a protective factor.

Overall, the analysis of the BCS data identified that specific variables were not only linked to victimisation risks but also predicted severe emotional responding. These included socio-demographic characteristics (gender, age, ethnicity), quality of life indicators (self-rated health, income, marital status, educational qualifications) and offence-specific characteristics (use of

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force/violence, sustained injuries, injury severity, severity of the emotional effect, alcohol consumption prior to the incident). The aim of the chapter was to provide epidemiological evidence that would provide the basis for describing not only the good that would be valued but also the characteristics of the sample that would be used for the valuation exercise. The main contribution of the BCS to the design of the survey instrument was the substantiation of using two-dimensional duration and severity based emotional outcome descriptions in the CV scenarios and specific victimisation-orientated questions to describe the sample and model the WTP valuations. Assuming that these characteristics would influence the estimation of intangible costs given their importance in all the models assessed in this study, they formed the backbone for the design of the survey instrument. For this reason, the questionnaire was structured in a way that corroborated with the findings described in the BCS study as the majority of the questions asked in the final survey that were not in the valuations section but were used to model the WTP data were sourced from this study. Thus, for demographic characteristics the survey asked respondents' gender, age, ethnicity; for quality of life indicators the survey asked self-rated health, happiness, income, marital status, educational qualifications; and for victimisation indicators the survey asked offence-specific and attitudes characteristics (previous victimisation experience, use of force/violence, sustained injuries, injury severity, crime seriousness, fear of crime, general alcohol consumption and prior to the incident).

Following the results from the 08/09 BCS analysis, the A&E study explored violence features from a different, more tangible perspective. A retrospective analysis into the characteristics of violence associated with the treatment of patients registered as victims of physical assault indicated that only 5.43% of the recorded cases were admitted to hospital and a approximately 20% of the sample was assigned with an MTS score varying from 3 to 5 (urgent-immediate). Assuming that MTS score can be used as a severity indicator; these results altogether suggest that despite the volume of violence-related cases, only a fraction is severe in terms of recorded injury.

Regarding injury characteristics, although the study did not present the medical diagnosis (see Appendix 1, §1.3 for injury specifications), the information thereon were used to sort the recorded injuries by anatomical site. Four groups were formulated, in which injuries were assigned to head, body, torso and unspecified. Head injuries were more prevalent reflecting 64% of the sample,

suggesting that head is the more susceptible body part in victims of violent assault and verifying the BCS findings. The focus of the study was to provide a clear, severity-based description of the typology of injuries typically sustained in a violent assault, concordant with the BCS two-dimensional emotional outcome descriptors. Thus, there was a need to identify a metric to reflect severity in the observed injuries.

The MTS score was employed for this purpose, typically used for sorting the ED patients according to their clinical urgency into those requiring immediate medical attention. Chi-squared test showed a statistically significant relationship between the injury sites and the MTS scores. CA results verified the consistency of the MTS score on the anatomical classification of injuries as their in-between distances indicated that head, torso and limbs categories were distinctively allocated in the mapping of their coordinates (see Figures 4:5-6). However, the distance between anatomical sites (row points) and MTS scores (column points) with respect to each other cannot always be directly comparable and the interpretation requires caution. This study, following Greenacre's (1984; 1993) interpretation pattern, assumed that each injury location point would lie in the neighbourhood of the severity score in which the injury's profile is more prominent. Thus, ratings of 3 (Urgent) were closer to head, unspecified and torso injuries, of 4 (Standard) closer to limb and head injuries, of 2 (Very urgent) closer to torso injuries whereas ratings 1 (Immediate) were distinctively out of the observable cluster. Under this interpretation scheme, the results implied that the amount of data in the 'Immediate' category was not sufficient to draw the point estimate of one (1) closer to the reported injuries; fact verified by the figures in the contingency table between the injury locations and MTS scores.[51] These findings suggested that head and torso injuries, typically rated as 'standard' and 'urgent', were most prevalent victims of assault. Head injuries shared similar distance between these two ratings, whereas unidentified injuries were closely related to the urgent category. Torso injuries were closer to 'urgent' ratings and compared to 'very urgent', whereas limb injuries were closer to 'standard' ratings. The analyses showed that the 'immediate', 'very urgent' and 'non-urgent' categories clearly distinguished from the rest, indicating that the profiles of injuries on average did not satisfy the specific severity criteria. Similar were the CA results for the alternative severity indicators (admission to hospital and arrival by ambulance) reinforcing the MTS findings on the associations between severity and anatomical sites of injury. Regarding admission to hospital, all

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[51] From the total of reported injuries (n= 36,077) only 63 were coded as of 'immediate' urgency.

anatomical sites were depicted very close not only to each other but also to the types of disposal suggesting that they were equally distributed to all assessed levels but clearly excluding those with unspecified injuries and those that did not wait or died in the department. Regarding the arrival proxy, analyses indicated that ambulance was associated more to head injuries compared to the rest injury locations whereas patients suffering from head injuries were equally likely to be brought to the hospital either by ambulance or by private vehicle. This further suggests that ambulance is the primary mode of transportation associated with such cases.

MCA was then used to visualise the associations between the levels of the three severity indicators and the anatomical site location. Based on the homogeneity of their profiles, two distinct severity-orientated clusters emerged from the analysis; one comprised head and limb injuries, no admission, standard urgency and all arrival modes except for ambulance and unknown (left hand side, see Figure 4:6) and the other unspecified injuries, ambulance and urgent priority (right hand side, see Figure 4:6). Such a clustering suggests that 'urgent' score, ambulance arrival and unspecified injuries share certain traits; similarly, the rest of arrival modes (private, public transport and walking), anatomical sites of injury (head, torso, limbs) and 'standard' urgency score conform to a general pattern. One interpretation pertains to severity (implied by urgency) and how it was spread (increased) towards right across Dimension 1 (see Figure 4:6). Given that this dimension accounted for the 74.5% of the observed variation it can be safely assumed that the depicted relationships were heavily influenced by the urgency score and ordered in the graph accordingly. This is further reinforced by interpreting the positions of the point estimates as indicators of the marginal frequencies between the assessed quantities (Hoffman & De Leeuw 1992). In this case, those categories with low marginal frequencies were plotted towards both edges of the map while categories with high marginal frequencies were plotted nearer to the origin of the map.[52]

Excluding the no-injury profile, the figures from this study suggest that injuries from the 'other wounding' and 'serious wounding' categories would correspond to MTS scores equal or greater than 4 (standard urgency) and equal or less than 3 (urgent) respectively and thus justifies the use of similar

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[52] The point estimates below the crossing of the reference lines, MTS score 5, unknown transportation on the left and MTS scores 1 and 2 and admission to hospital on the right, were category points with low marginal frequency and hence were plotted towards the left and right hand side edges of the map respectively. On the other hand, the point estimates observed at the crossing of the reference lines or above, denoted categories with high marginal frequencies.

classification for the purpose of this research. A combination of the evidence above was used to construct the following injury descriptors:

Head & Face Injuries: *Level 1* refers to minor injuries (e.g. slight scratching, bruising, black eye and other superficial injuries) that do not necessarily require medical attention. Such injuries typically do not prevent the victim from daily activities but can be noticeable and leave some scarring. *Level 2* refers to more severe injuries (e.g. broken nose, concussion, internal injuries) that require medical care and possibly even hospitalisation. The injuries incorporated in this level do not encompass life threatening situations but typically are expected to result in inconvenience for the victims and prevent him/her from normal activities for a couple of weeks.

Torso Injuries: *Level 1* refers to slight injuries observed in the abdominal area (e.g. lacerations, cuts, bites, abrasions, soft tissue injury/wounds, bruising, other superficial injuries) that do not necessarily require medical attention but can be painful and noticeable. The injuries in this category are not expected to leave any significant scarring or prevent patients' normal activities. However, injuries but can be noticeable and a degree of discomfort is expected. *Level 2* refers to more severe injuries (e.g. broken bones, internal injuries) that will necessitate medical care and hospitalisation. Again, life-threatening situations were not incorporated in the level, as it would complicate the provision of a concrete and honest representation. Instead, only injuries that were not life threatening but serious enough to cause major discomfort and disruption in patients life were considered (e.g. take sick leave, assistance from others).

Limb Injuries: *Level 1* integrates minor injuries on legs and/or arms (e.g. lacerations, cuts, bites, bruising, other superficial injuries) that do not typically need medical attention nor prevent from usual activities. They incur some discomfort but are not expected to leave any significant scarring. *Level 2* encompasses more serious injuries on legs and/or arms (e.g. fracture, compound fracture, dislocations) that should be treated in the hospital. Life-threatening situations were not considered but consequences entailed consistent discomfort, malaise and abstention from usual activities until health is restored.

4.5 Conclusions

The evidence from the A&E and BCS data analyses formed the basis for constructing plausible scenarios with a representative description of violent victimisation outcomes. Aside directing the questionnaire's structure, BCS results suggested a two-dimensional structure underlying victims' emotional reaction drawing from the duration of the demonstrated symptoms and thus the severity they implied, i.e. moderate and severe emotional stress. In the same vein, CA techniques indicated that the grouping of injuries by anatomical site corresponded well with the assessed measures of severity; thus identifying a similar two-dimensional severity-based structure underpinning the physical aftermath of an assault. This substantiated the two-level description of the victimisation outcome when referring to both the psychological and physical consequences of a violent assault in the valuation scenarios.

The descriptive analysis looked into the characteristics of injury focusing on patients registered as victims of assault. Analyses indicated that the sorting of inflicted injuries according to their anatomical site corresponded well to the employed measures of severity. Arrival by ambulance was assessed as a measure of injury severity showing promising results. The main outcome of the study was that it provided a severity-based classification of the injury descriptors resulting from violent victimisation. Two levels of seriousness emerged, minor injury and severe injury. Each of those was described based on the physical location the injury could occur. The findings from this study coupled with published evidence lead to the identification of concrete injury descriptors to be used in the next step of this research for successfully communicating the outcomes of a violent assault.

Chapter 5

Pretesting stages and battery work

"Many surveys, regrettably, contain redundant or irrelevant questions, which have been put in for the sakes of 'interest' but have no bearing on the problems at issue."

Oppenheim (1992, pp.117)

5.1 Introduction

Eliciting monetary values by asking people to consider an unwanted physical and psychological change is complex for both the researcher and the respondent. For the respondent the difficulty lies in the process of completing the survey that undoubtedly is both cognitively and emotionally demanding (Cummings, Brookshire & Schulze 1986; Arrow et al. 1993; Schkade & Payne 1994). Moreover, the sensitivity of the issues tackled in such a study generates problems associated with the way the scenario that leads to the reduction in the risk of crime is described and with the chosen payment mechanism (Atkinson, Healey & Mourato 2005). Hence, the researcher faces a plethora of issues regarding design of the survey instrument when employing this type of research. Even the simplest questions require appropriate wording, format, content, placement and organisation. As trivial this might seem to be, a properly designed CV questionnaire is no easy task (Mitchell & Carson 1989) and yet constitutes the key element in every SP preference study. In terms of development, such issues relate to the effective writing of scenarios and questions that are uniformly, correctly and easily understood by the average respondent while encouraging him/her to answer in a considered and truthful manner (Bateman et al. 2002). Consequently, the text of the survey needs to be clearly articulated, in an intelligible way so that all information provided are credible, consistent and comprehensible. To tackle the lack of suitable quantitative procedures for validating the survey instrument, the validity can be claimed instead in a qualitative manner, through the careful design and development of the SP study (Bateman et al. 2002).

5.2 Principal objectives

The principal objective of this chapter was to present the development of a new CV survey instrument that was designed specifically to meet the needs of this study. For validation purposes, the research instrument had to be tested before being used in the main survey. The lack of golden standards in the CV research was tackled through extended battery work. The main advantage of undertaking battery work is that it provides advance warning about where the main research project could fail, where research protocols may not be followed, or whether proposed methods or instruments are inappropriate or too complicated. In the words of De Vaus (1993, p. 54) "*Do not take the risk. Pilot test first*".

The current project underwent a series of developmental trials[53] as each trial served specific purposes, which could not be all addressed in a single trial. The main objectives of the overall battery work are outlined below:

- To develop and test the adequacy of the research instrument

- To develop the research plan

- To successfully design the research protocol and assess whether the outcome is realistic and workable

- To assess the feasibility of the full-scale survey

- To establish whether the sampling frame and technique are effective and assess the likely success of different recruitment approaches

- To identify possible logistical problems deriving from the use of the methods suggested by the literature review

- To collect preliminary data

- To determine the resources required for the successful conduct of the study

- To assess the proposed data analysis technique to uncover potential problems

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[53] The term "pilot study" is used in two different ways in social science research. It can refer to so-called feasibility studies which are "*small scale version[s], or trial run[s], done in preparation for the major study*" (Polit et al. 2001, p. 467). However, a pilot study can also be the pre-testing or 'trying out' of a particular research instrument (Baker 1994, pp. 182-3).

- To train the principal investigator in as many elements of the research process as possible and convince on her competency and knowledgeability

- To ascertain the overall validity of the research project and demonstrate that it is worth supporting

Despite the importance of conducting battery work, the literature review identified a great lack of available pilot reports (Lindquist 1991; Muoio, Wolcott & Seigel 1995; Van Teijlingen et al. 2001). If battery work was undertaken, this was only reported to justify a particular method or research tool employed in that research. Prescott and Soeken (1989, p. 60) comment thereon *"[...] pilot studies are likely to be underdiscussed, underused and underreported"*. Pre-testing is often underreported with research papers either leaving such procedures out of the final print or referring to one element of the battery work, as for example, to the 'piloting' of a questionnaire stating that it was tested for validity and reliability while omitting other relevant information (De Vaus 1993). In those few cases where testing procedures are mentioned in the final academic papers and reports, researchers comment that they had learned from the pilot study and made the necessary changes, without offering the reader details about what exactly was learnt. Such an output would be invaluable to researchers embarking on similar projects, particularly because pilot studies can be "*time-consuming, frustrating, and fraught with unanticipated problems, but it is better to deal with them before investing a great deal of time, money, and effort in the full study*" (Mason & Zuercher 1995, in Adegoke et al. 2007, p. 181). Crosswaite and Curtice (1994) argue that the research climate demands accountability from researchers, which means that there is a need to ensure the best possible use of research results. It was also deemed as an ethical obligation to report issues arising from all the parts of this project, including the pilot phase, in an effort to make the best use of the overall research experience. For this reason, all trial sessions were reported explicitly in this chapter to demonstrate the actual improvements made to the study design and the research process.

5.3 Methodology

Three phases were involved in the design of the questionnaire. First was the identification of the intangible costs as the 'non-market good' to be valued followed by the construction of the valuation section. Second was the selection of the appropriate demographic and experience questions to be used not only to describe the sample but also to assess their role in the value elicitation. The third phase included the qualitative validation of the survey instrument, which and was carried out in four stages outlined in the following sections. The survey material for all pretesting stages is attached in Appendix 2.

5.3.1 First pretesting stage

The objectives of the first pretesting stage were: (i) to determine the appropriateness of the survey instrument and employed measures in physical settings, (ii) to provide a solid basis for the further development of the questionnaire and (iii) to identify potential practical problems in following the research procedure.

The first stage comprised two pretesting surveys that used hard a copy questionnaire (pen and paper) and brief face-to-face interviews. Considering the character of the study, a small sample was initially required. Forty responses in total were gathered (20 per trial) with the sample being Cardiff University (CU hereafter) students for convenience and practicality reasons. No exclusion or inclusion criteria were applied, other than the respondents being students and no award was offered to secure the interest of the respondents. All data were collected under conditions of informed consent. No identifiable information was collected from the respondent throughout the survey and participants were informed that they were free to withdraw at any time. All data were firstly inserted to a Microsoft Office Excel Worksheet (.xlsx) and then appropriately transformed into a .dta file. All analyses were conducted using the STATA. Prior to the commencement of each trial, ethical approval was granted following CU's procedure for research involving human participants. The Dental School Research Ethics Committee (DSREC) confirmed a favourable ethical opinion for both trials; the first on 29th January 2011 and the second for the revised project on 7th April 2011

(DSREC Reference Number: 10/17). Data collection for the first trial took place between February and March 2011, whilst for the second trial between April and May 2011.

The study adopted a twofold type of approach to the participants to gather the desired number of responses. Respondents were approached in CU premises; at the ground floor foyer before and after lecture times and at the 4th floor Dental library (at the IT room and at the library entrance). At all times, questionnaires were distributed face-to-face. Information on the study and its pilot character were given before completing the questionnaire and respondents were given the options of completing the questionnaire at that time or returning it completed at their earliest convenience. For this purpose, they were provided with the researchers' phone number, office number and pigeonhole placement. Respondents were prompted to make comments on the questions in case they did not want to discuss it with the researcher when returning the questionnaire and/or keep notes on the questions that were unclear to them to discuss them after completing it. The researcher remained at the site of dissemination to maintain direct contact with the participants. A brief interview was conducted with each respondent after the completion of the questionnaire to comment on the provided answers. Following the questionnaire completion, respondents were enquired on their eligibility to engage in focus-group conversations.

A focus group discussion concluded each trial, during which all members were handed the questionnaire and were firstly asked to complete it while making notes. Then, following the methodology adopted by Zarkin, Cates and Bala (2000) they engaged a group discussion led by the researcher, mainly focusing on the issues noted during the completion. The purpose of the focus groups was to determine how respondents interpreted the valuation questions, the clarity of the information presented and the respondent's overall reaction to the survey. Comments made from these individuals were used to modify the survey instrument in order to improve readability and understandability.

5.3.2 Second pretesting stage

Following the comments and findings from the first pretesting stage, the pre-test survey instrument was drastically revised producing an advanced draft of the questionnaire. However, there

were issues regarding the content and the layout of the questionnaire that remained to be addressed. Moreover, given that the survey would not only address this segment of the population it was deemed necessary that the questionnaire should also be tested on the general population. Hence, the remaining stages employed Cardiff residents using convenience-sampling techniques. To address the issues that emerged from the first pretesting stage and provide the means for fine-tuning the questionnaire, the second pretesting stage involved two different sessions; one-to-one interviews (n=28) and a 90 minute focus group discussion (n=7). The purpose of this stage was not to collect material such as demographic or socio-economic information but to obtain respondent's opinion on the context, the layout and the communication of the survey instrument.

5.3.2.1 One-to-one interviews

The main objectives were: (i) to assess the revised instrument and identify remaining problems in the wording and the formats used for answering each of the questions; (ii) to assess respondents' understanding of the available information; (iii) to identify any possible adverse effects (e.g. distress) caused by the survey; (iv)to collect direct OE information about how much respondents were willing to pay alongside with comments that justified the total amount, and (v) to conclude on the payment vehicle.

The protocol of one-to-one interviews entailed the interviewing of a group of Cardiff citizens on a face-to-face basis using a mall-intercept sampling approach (Bush & Hair 1985; Velu & Naidu 2009; Bell, Huber & Viscusi 2011). The data collection took place in June 2011. The process involved stopping the shoppers, screening them for appropriateness, and either administering the survey on the spot or inviting them to a research facility located in the mall to complete the interview. Despite being a convenience sampling technique, mall-intercept has been used in SP pretesting procedures (Boyle et al. 1994; Zarkin, Cates & Bala 2000; Bell, Huber & Viscusi 2011). Fifty copies of each version of the questionnaire were printed in total for the purpose of this piloting trial.

The recruitment took place in the St David's Cardiff Shopping Centre and the applied inclusion criteria were being over 18 years of age, speaking and reading English. The participants were offered £5 in cash as an incentive to participate. Twenty-eight interviews were achieved in which respondent were asked to complete the questionnaire or specific relevant parts of it and comment thereon. Two different versions of the valuation module were prepared for this purpose, each with different layout

and wording. The first version included the revisions from the first pretesting whereas the second differed in the structure and the description of the valuation module. Participants were prompted to directly address the researcher with any questions that arose during the completion of the survey instrument or keep notes on the questions that were unclear to them to discuss them after completing it. On the return of a complete questionnaire, the respondent was paid, enquired for a general overview of the project, asked a series of questions regarding the layout of the questionnaire and was invited in participating further in a focus group discussion for the same project. No identifiable information was collected throughout the survey as the specific section of the questionnaire was not included and participants were informed that they were free to withdraw at any time.

5.3.2.2 Focus group

Following Zarkin, Cates and Bala (2000), the question path was open-ended, with very few standardised questions, to permit discussion to emerge. The aims of the discussion were: (i) to clarify previous findings; (ii) to ascertain perspectives on the payment vehicle in the CV section; (iii) to investigate the diversity in the CV valuations in conjunction with the expressed comments; (iv) to explore the sensitivity in the victimisation module, and (v) to gather ideas and opinions that were outside the scope of prepared questions.

The focus group participants of this piloting trial were recruited during the implementation of the one-to-one interviews (n=7). The participant selection was based on respondent's motivation during the one-to-one interviews as an effort was made for the focus group to have some homogenous aspects; in this case the interest in further participation in this research. Given that focus group results were not quantifiable, rigid random selection was not a requirement at this stage (Morgan 1996).

All participants were informed on the duration and the objectives of the discussion and were offered £20 each as an incentive to secure attendance. However, from the 15 initial affirmations, seven persons arrived. The discussion took place on the 25th of June 2011, at 11:30 am at the Cardiff Central Library and lasted approximately 90 minutes including one 10-minute break. The facility included a conference room with an oval-table to aid interaction and refreshments were served to create a comfortable atmosphere. The questionnaire was distributed to all participants in

paper they were firstly asked to complete it while making notes. The discussion was not structured and the purpose was to gain insight at participants' feelings and beliefs on the proposed material, without directing or deliberately misleading respondents in any way. All participants had equal chances of participation as the researcher who ensured that the group was kept on task and that all divergent viewpoints and ideas were heard facilitated the discussion. One of the limitations during the conduct of this pretesting stage was the lack of an assigned observer. This was partially tackled with a Dictaphone used to supplement facilitator's notes on the non-verbal cues. However, it was expected that some nonverbal behaviour would be lost as often multiple people speak in overlap. This issue was later addressed with the verbal protocol.

5.3.3 Third pretesting stage

The completion of the two pretesting stages provided a significantly improved version of the questionnaire in terms of both content and layout while they indicated that the employed revisions made the questionnaire more readily understood and intelligible. The third stage entailed the assertion of response and content validity. The participating pre-test, termed as think-aloud sessions (verbal protocols[54]), was deemed as the most suitable procedure for testing the usability of the questionnaire and ascertaining response validity, in which "*respondents are told that this is a practice run, and are asked to explain their reactions and answers*" (Converse & Presser 1986, p. 52).

The aims of this stage were (i) to check the wording and interpretation of items and test the conformity between the obtained responses and the respondents' explanations and (ii) to obtain feedback on issues related to the questionnaire as a whole, such as the general flow, division into sections, participants' interest and attention.

All sessions were conducted in July 2011. The limitations imposed by the characteristics of this trial and the time available for its implementation only allowed for convenience sampling. Therefore, acquaintances in the work placement of the researcher were used and the selection criteria were age (adults) and literacy in the English language.

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[54] A typical verbal protocol session involves having a participant perform a certain task while verbalising his/her thoughts ("talking aloud"). The recording (video and/or audio) of this verbalised thought process is referred to as a verbal protocol.

The think-aloud sessions were designed based upon the specific guidelines detailed in Austin and Delaney (1998), Schkade and Payne (1994) and Terwee et al. (2007) while adopting the methodology described in Petrić and Czárlb (2003). The sessions followed a concurrent verbalisation process[55] (Austin & Delaney 1998) in which the participants were individually informed on the procedure and objectives of the experiment and were asked to sign a consent form before starting the experiment. During the experiment, participants were encouraged to think aloud and verbalise all their thoughts while completing the questionnaire, regardless of how trivial, unimportant or unrelated they were regarded. The participant was not prompted unless (s)he remained silent for more than a few seconds. The prompts used were simple (e.g. "Please keep talking") and participants were advised to point out unclear items while asking for explanations if required. Wording and conceptual problems were discussed at all times and additional ideas were invited in order to ensure the suitability of the questionnaire to the target population. As soon as the questionnaire had been completed, the interviewer asked additional questions if it was felt that more information should be elicited to clarify certain issues identified during the verbalisation task. The think-aloud sessions were recorded using a Dictaphone and were subsequently transcribed including hesitations, pauses and emotional responses (e.g. laughter). The analysis first focused on individual items, identifying and evaluating responses to each statement by all respondents. The number of comments was taken into account; however, even a single comment was considered important if it offered a new insight or interpretation of the item. Comments on the wording of the questions used at that time were also considered given that they provided evidence on the correspondence (or lack of it) between the stated responses. Finally, general remarks on the questionnaire as a whole were compiled and analysed.

Think-aloud protocols were originally developed as a research tool in the field of cognitive psychology as a means of studying human problem-solving processes (Morrison 1999). It is particularly useful in studying areas where little is known (Wiedenbeck, Lampert & Scholtz 1989) and currently constitutes a widely used method in usability testing (Morrison 1999). Ericsson and Simon (1993) identified that the principal assumption in this type of research is that the verbal stream in essence reflects the cognitive processes involved in performing a task, hence providing

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[55] Concurrent protocols are delivered at the same time as the participant performs the task and are ideally unprompted by the experimenter (Austin & Delaney 1998).

information not only on the processes per se but also in the ways they function. In addition, the verbal protocols help in uncovering other issues unlikely to be observed otherwise, such as misconceptions and conceptual changes or affective responses (Trickett & Trafton 2007). In the context of this research, this approach would provide an invaluable insight on how respondents understand the questions in the questionnaire, how they think about the intricate issues involved in the scenarios and how they perceive the valuation task (Bateman et al. 2002).

Last, expert's critical acclaim was sought on the revised material to ascertain content validity. Hence, approval was initially sought from the Cardiff and Vale Research Review Service (CaRRS) and granted on 11th of September 2011 (Protocol No. SPON 992-11). In the NHS application (NHS REC: use of Integrated Research Application System, IRAS) that followed, the Local Research Ethics Committee (LREC) rose to issues pertaining on the content or layout of the questionnaire thus confirming the suitability of the material for further application on the 27th of September 2011 (REC Reference No. 11/WA/0280).

5.3.4 Fourth pretesting stage

The previous pretesting stages concluded on the development of the questionnaire. The final stage of pretesting, known as a "field" pilot, dictates the use of the same mode of administration and a similar sample of respondents to that used in the main survey (Bateman et al. 2002). The principal objectives of the last pretesting phase were: (i) to investigate the use of the Internet and ensure the feasibility of the web-based study; (ii) to identify possible issues arising from the on-line completion process, and (iii) to collect preliminary data for the researcher to familiarise with the type and nature of collected information and accordingly design the main analytic strategy.

The web-based survey method was selected for a number of reasons. First, the only means of communication with a number of participants would be via email as all subscribed to a mailing list demonstrating their interest in participating in similar research projects. Second, to the cost and time limitations imposed on this study would constitute any other traditional method impossible, as compare to other methods web-based surveys are significantly cheaper and quicker to conduct. Third, this trial aimed at collecting a greater number of responses compared to the previous

pretesting stages. Considering the time available for the implementation of this trial, only a web-based intervention would allow the collection of such a number of responses as it would allow cheap and easily accessible web-based advertisement techniques. Fourth, given that the trial would provide a fraction of the number of responses that would be expected in the main study, the web-based experiment would provide an indicator of the time needed to collect the required number of responses for the main study. Finally, the conduct of this trial would provide the means for investigating the use of Internet as a data collection mode of choice for CV experiments; matter not yet fully addressed in the literature (Olsen 2009; Lindhjem & Navrud 2011a; 2011b; Nielsen 2011). In all, the methodology applies to the overall feasibility of the project as any other method would be very time consuming and would not allow for the appropriate number of responses to be collected on time.

Participants were primarily Cardiff residents, including CU staff and students. The survey link was communicated in two ways; one by email invitation to a predefined list of participants and the other via web adverts. The mailing list comprised participants whose consent to be contacted had been obtained during their participation in previously conducted studies. Dr. S.C. Moore, administrator of the Violence and Society Research Group web site, made the list of e-mail addresses available. The survey was also advertised within CU network and premises, using adverts in the Cardiff portal Announcement table, tweets through @CardiffDental, A4 posters in CU libraries (Herbert Duthie, Trevithick, Aberconway, Brian Cooke), cards and posters in Cardiff's Student Union. Everyone with access to these means was eligible for participation. The incentive of £50 book vouchers in a prize draw was used. Although the survey was primarily web-based, it was decided that an alternative format should be made available to avoid losing willing respondents due to technical difficulties invoked by the employed format. Hence, all communications mentioned that participation was also invited with hard copies of the survey, via the means of post or fax, upon request. The described communication procedures define a form of convenience sampling. Given that the survey's target population was Cardiff residents, the means available for conducting the study did not allow for any other way of defining a random sampling strategy or framing any other probabilistic sampling scheme. The study aimed at collecting a minimum of 35 usable responses. Additional institutional ethics approval for this survey was not sought, since the project had already been exempt.

The data were reviewed to discern potential patterns that might distinguish web from hardcopy respondents. After passing the scrutiny of the supervisory team, the survey was uploaded on the Bristol Online Surveys (BOS) server and was subsequently tested in-house and with several remote participants. The link that was made available by the BOS and the survey's interface was tested with a number of different browsers (Internet Explorer 9.0; Mozilla Firefox 3.6, Google Chrome 17, Safari 5.1.2, Opera 11.61), operating systems (Windows XP, Windows 7, OS X Lion) and Internet access types (ADSL/WiFi, cable). The standard CU theme was used and on each web page, the CU logo was displayed in a static JPEG banner alongside the title of the survey. Each question was displayed in bold, followed by a brief explanation. Additional information in pop-up boxes was also provided, with examples to help the respondent in case of difficulty in answering a question. List boxes were used for close-ended questions and text fields were available for answers to OE questions. If the respondent did not qualify for a specific question based on previous answer, skip was performed automatically. The web-based instrument was designed to prohibit multiple or blank responses by not allowing the participant to continue without first correcting the response error. This was done to secure a full set of responses from all participants.

The final version of the questionnaire was used in this trial, including all the revisions resulting from the testing procedures discussed in the previous sections. This trial also introduced the EQ-5D-5L (EuroQolGroup 1990) as a health outcome measure after the recommendations of the supervisory group. The survey instrument comprised 42-questions with 105 discrete answers. The material was presented on eight sequential screens under respectively headed sections (see Table 5:1). This was preferred over all material being presented on a single, lengthy Web page, for ease of access and navigation as well as for avoiding potential server time-outs in case of slower connections.

Table 5:1 Web-based trial survey instrument overview

Screen no.	Heading	Content
1st	Welcome and Hello	Privacy statements and participant information sheet.
2nd	Dear Participant	Covering letter and thank you note.
3rd	Part I "Scenarios A-F"	Fist part of the valuation module: scenarios description and related questions (Q1-Q11).
4th	Part II "Victimisation Prevention Programme"	Second part of the valuation module: prevention programme scenario description and related questions

		(Q12-Q18).
5th	Part III "Experience Questions"	Questions on respondents experiences, including alcohol consumption and previous experience with violence (Q19-Q24).
6th	Part IV "Demographics"	Respondents' demographics and other characteristics (e.g. health status) (Q25-Q38).
7th	Your comments	Space for comments and prize draw information (Q39-Q41).
8th	Last page	Submission answers page and contact information.

The survey was launched on September the 29th and closed on November the 10th, 2011. Responses were transcribed in an .xlsx workbook and then appropriately compiled to a coded database for being used with STATA. A comprehensive codebook was compiled for the ease of navigation through the dataset detailing the coded questions, the types, names and range of the values in addition to listing the eligible entries in case of close-ended questions. All variables were initially coded in binary format. The resulting file was password-protected and stored on a secure PC in a locked office on CU premises. Only the researcher had access to this information and participants were known only by their identification code.

5.4 Results

The results for the each of the pretesting trials are outlined in brief sections below. For parsimony, only the main descriptive statistics were included for the first three stages as their focus lied in collecting qualitative and not quantitative information. The only exception was the fourth pretesting stage where among the principal objectives was the collection of quantitative data to define the analytical strategy that would be later used with the primary survey dataset.

5.4.1 First pretesting stage

The first pretesting stage included two field trials with CU students. Table 5:2 presents a summary of the sample characteristics for each trial.

Table 5:2 Summary of sample characteristics in the first pretesting stage (both trials)

Variables	Sample[1]			
	Trial A		Trial B	
Total number of individuals	20		20	
Males	9	(45%)	14	(70%)
Average age (in years)	24.5	(SD=2.91)	26.5	(SD= 3.56)
Ethnicity				
British	15	(75%)	19	(95%)
Asian	2	(10%)	1	(5%)
Other	3	(15%)	-	
Average monthly income	£903	(SD=552.8)	£1,230	(SD= 606.85)
Average leisure spending per week	£50	(SD=41.1)	£75.25	(SD= 46.61)
Alcohol consumers	16	(80%)	17	(85%)
Average spending on alcohol per night out	£11.21	(SD=£7.66)	£ 15.23	(SD= 9.67)
Average spending on alcohol per week	£12.35	(SD=£13.43)	-	
Victims	8	(35%)	9	(40%)
Under the influence of alcohol	2	(25%)	3	(33.33%)
Assailant under the influence of alcohol	4	(62.5%)	4	(44.4%)
Acquaintances victims	15	(75%)	11	(55%)
Under the influence of alcohol	4	(27%)	1	(9.09%)
Assailant under the influence of alcohol	7	(47%)	5	(45.45%)

[1] Numbers may not add up to total due to missing data; percentages may not add up to total due to rounding

5.4.2 Second pretesting stage

5.4.2.1 One-to-one interviews

Twenty-eight responses were recorded. The average respondent was male (53.57%), 28.5 years old (SD= 6.849) and British (64.25%). Average monthly net income was £1,450 (SD= 345.242) as calculated from 23 responses (5 respondents did not answer this question). Table 5:3 summarises the sample characteristics.

Table 5:3 One-to-one interviews: Sample characteristics

Variables	Sample[1]
Total number of individuals	28
Males	15 (53.57%)
Average age (in years)	28.5 (SD= 6.849)
Qualifications	
None	2 (7.14%)
Apprenticeship or A/AS level	11 (39.28%)
College or University	10 (35.72%)
Higher degree (Masters, PhD etc.)	5 (17.86%)
Occupational status	
Working	14 (50%)
Unemployed	2 (7.14%)
Student	7 (25%)
Other	5 (17.86%)
Ethnicity	
British	18 (64.29%)
Other white background	7 (25%)
Black or Black British	1 (3.57%)
Other	2 (7.14%)
Average monthly income	£1,450 (SD= 345.242)
Average leisure spending per week	£46.75 (SD= 36.87)
Alcohol consumers	23 (82.14%)
Number of alcoholic drinks per single occasion	6 (SD= 5.264)
Worried about crime	
Never	1 (3.57%)
Just occasionally	17 (60.72%)
Some of the time	10 (35.71%)
Policing is effective	11 (39.29%)
Victims	7 (25%)

[1] Numbers may not add up to total due to missing data; percentages may not add up to total due to rounding

5.4.2.2 Focus group

Quantitative information was not collected at this stage. Instead, comments that related to revisions or suggestions for improvement were transcribed. However, an anonymous one-page demographic questionnaire was administered to all members of the group immediately after arrival, to gather descriptive information about the participants. Table 5:4 presents a summary of the recorded sample characteristics.

Table 5:4 Focus group: Sample characteristics

Variables	Sample	
Total number of individuals	7	
Males	3	(42.85%)
Average age (in years)	25	(SD= 5.99)
Qualifications		
Apprenticeship or A/AS level	3	(42.85%)
College or University	2	(28.57%)
Higher degree (Masters, PhD etc.)	2	(28.57%)
Occupational status		
Working	5	(71.42%)
Student	2	(28.57%)
Other	1	(12.28%)
Ethnicity		
British	4	(57.14%)
Other white background	3	(42.85%)
Marital status		
Married	3	(42.85%)
Single	3	(42.85%)
Other	1	(12.28%)

5.4.3 Third pretesting stage

Participants were from different national and linguistic backgrounds and differed in occupational status and educational attainments in an effort to ensure the transferability of the sample. The informant's profiles are presented in Table 5:5.

Table 5:5 Verbal protocols: Informants profiles

Informant[1]	Age	English literacy	Education	Work placement	Interview characteristics	
					Place	Recorded session
Elaine	25	Native	Undergraduate in Psychology		Cardiff	70 mins
Ian	26	Native	Economics graduate	Working for a welsh public organisation	Cardiff	55 mins
Kostas	27	Non-native	Medicine graduate	Working as a doctor	Swansea	45 mins
Ellie	27	Native	Maths graduate	Working as a manager in retail	Cardiff	65 mins
Sophia	28	Non-native	Economics graduate	Working as a lecturer	Cardiff	75 mins
Nick	28	Non-native	Computer Science graduate	Doing a PhD in Pattern Recognition and Image Analysis	London	65 mins
Drew	30	Native	Dentistry graduate	Working as a dentist	Cardiff	50 mins

[1] All names have been changed to protect identity.

5.4.4 Final pretesting stage: Web-based survey

A total number of 64 participants completed the web-based survey. Table 5:6 presents a summary of the sample characteristics. Briefly, the average respondent was white female, single, 27 years old and student, with a net annual income of £11,044 (SD= 7,410.13). The large standard deviation was attributed to the diversity in the respondent's occupational status as the range of the net annual income was found to be between £1,200 and £37,200.

Table 5:6 Web-based trial survey: Sample characteristics

	Sample	
Total number of individuals	64	
Males	31	(48.44%)
Average age (in years)	26.9	(SD= 8.14)
Ethnicity		
White	57	(89.06%)
Mixed	1	(1.56%)
Asian or Asian British	3	(4.69%)

Chinese	1	(1.56%)
Any other ethnic group	2	(3.13%)
Average monthly income	£920.31	(SD= 617.51)
Average leisure spending per week	£45.83	(SD= 43.66)
Alcohol consumers	51	(79.69%)
Average spending on alcohol per night out	£11.33	(SD= 6.22)
Marital status		
Married	11	(17.19%)
Single	44	(68.75%)
Other	9	(14.06%)
Occupational status		
Working	26	(40.63%)
Unemployed	3	(4.69%)
Other	1	(1.56%)
Student	34	(53.13%)
Victims of violent crime	18	(28.13%)
Under the influence of alcohol	8	(44.44%)
Repeat Victimisation (3 times or more)	6	(33.33%)
Physically Injured	11	(61.11%)
Medical treatment required	3	(27.27%)
Acquaintances victims	33	(51.56%)
EQ-5D-5L outcome measures		
Mobility	1.05	
Self-care	1.05	
Usual activities	1.11	
Pain	1.16	
Anxiety	1.74	
Health score	80.47	(SD= 17.16)

Notably, all respondents opted to disclose all information asked throughout the demographic and experiences section of the questionnaire and one refusal was recorded in the victimisation section. The victimisation module indicated that 31 (48.44%) respondents had been threatened with the use of force or violence in the past, while 18 (28.13%) had prior victimisation experience. Half of those indicated that they were victimised once whereas three and six respondents indicated that they had been victimised twice (16.67%) and three or more times (33.33%) respectively. From those that indicated physical injury in the most recent assault (11 respondents; see Table 5:6), head was the most prevalent part of the body by 72.73%, followed by torso (18.18%) and limbs (9.09%). Superficial injures were most frequently observed, and the majority of the respondents rated the seriousness of the incident as "*Fairly serious*" (54.55%), followed by "*Not very serious*" (27.27%) and "*Very serious*" (18.18%). In the universal question "*How often do you worry about becoming a victim of violent*

crime?" responses varied; more specifically "*Never*" was opted by 7 respondents (10.94%), "*Just occasionally*" by 37 (57.81%), "*Some of the time*" by 17 (26.56%) and "*All/most of the time*" by 3 (4.69%).

Regarding the valuation section, only one protest was recorded. For parsimony, the numerical values are not presented but description follows. The ranking results indicated that the most disliked scenario was Scenario B, followed by Scenarios D and F in the second and third place respectively. Fourth, fifth and sixth places were attained by Scenarios A, C and E respectively[56]. The great standard deviation observed in all values captures the diversity in respondent's valuations as no boundaries have been imposed on the presented values. 67.19% of the respondents identified victim's physical injuries alongside with the upset and inconvenience they suffer as the most important feature for working out such compensatory amounts. The second part of the CV section included the question on the efficiency of police as the best measure against violent crime. Responses varied with the majority opting against the statement by 42.19%. Nineteen respondents were affirmative (29.69%) and the remaining eighteen (28.13%) were not conclusive. The partnership programme was supported by 85.94% for the 10% crime prevention and by 93.75% for the 50%, whereas seven respondents of those that opted for "*No*" or "*Do not know*" in these questions stated that they would change their vote if the programme offered compensation to the victims.

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[56] Scenario B ranked first by 65.63% (42 respondents); Scenario D ranked second by 42.19% (27 respondents); Scenario F ranked third by 45.31% (29 respondents); Scenario A ranked fourth by 67.19% (43 respondents); Scenario C ranked fifth by 39.06% (25 r respondents); Scenario E ranked sixth by 43.75% (28 respondents).

5.5 Discussion

The previous chapters set out the theoretical basis for designing the experimental approach of this thesis. The previous findings defined the needs and the further objectives of this research and provided the backbone for developing a survey instrument suitable for such a purpose. This chapter presented the pretesting of the survey instrument, which constitutes the first step in the design of an effective questionnaire as it "*enables research to focus on priorities and translate needs into actionable decisions about what should be measured*" (Skowronek & Duerr 2009, pp.413-14). The pretesting was carried out in four stages, each with different approach to the respondents and allowed the collection of demographic and behavioural data that were used to improve the survey instrument. This section discusses how the outcomes from each of the testing procedures were used to refine the questionnaire.

The first stage of the battery work revealed a number of deficiencies in the design of a proposed experiment. Given that the survey instrument did not significantly change between the pre-testing trials, the results are discussed overall bearing in mind both testing sessions. The revisions and the justification for the changes are outlined, alongside with some notable quotations from the focus group discussions.

The first observation pertained to the competition time. Although it was initially estimated at 20 minutes, testing indicated that at least 30 minutes were required due to the complexity of the survey. In both focus group discussions the participants regarded the survey with curiosity and hesitation, characterising the questionnaire "*bizarre*" and "*unusual*". The structure of the draft questionnaire was deemed inefficient, as had the most crucial questions at the end. Although this was deliberately done to familiarise respondents with the survey, it was indicated that by the time respondents reached the valuation section they had admittedly lost their interest and concentration.

Second, the question on income was thought to be confusing. Although the reason could possibly be the fact that as students most of the respondents were maintained based on student loans and not on actual income, both focus groups suggested rephrasing. Similar actions were suggested for some questions on alcohol consumption and leisure activities which, although were rephrased, were later dropped to avoid confusion. For example, the numerous questions on alcohol consumption mislead the responds to assume that the victimisation risks later valued in the corresponding section directly

derived from alcohol misuse. Comments such as *"Why pay victims when they go for it?", "Should I pay more for them to drink more?", "They deserve it", "If I support such a programme then every drunk will go and get money"* were recorded, highlighting a serious source of potential bias. To ensure that this would be avoided in the next stages, the amount of questions on alcohol were significantly reduced.

The section on Previous Victimisation Experience showed a number of deficiencies as the section lacked consistency and sharpness. Although it maintained the BCS format for validity purposes, it was drastically redesigned to (i) keep the questionnaire sharp, (ii) reduce the time of completion, (iii) minimise the distress of recalling specific unpleasant incidents on the respondents and (iv) keep the focus on the individual's experiences. To correct for those issues and ensure the safety and wellbeing of the participants while being consistent with the DSREC approval, all questions that did not provide significant output to address the hypotheses of the study were discarded and wording and format amendments were made on those that remained. For example, the option of skipping questions in case that they did not qualify for those was added (*"If the answer in NO skip to the question X. If YES continue with the next questions"*). For clarity and consistency "*victimised*" was changed to "*assaulted*" as the later discussions identified that the notion of victimisation varies among people. For instance, some people would regard verbal abuse as victimisation; whilst others would not classify an incident as victimisation if they were not physically harmed. A few other minor corrections included the replacement of the "*Refused*" option with "*Would rather not answer*" and the substitution of italic font with bold as it emerged that italic font did not print well to highlight a difference for the respondents.

As expected from the early stage of development, numerous issues emerged from the valuation section. The scenarios dictated a more succinct presentation and the wording was revised following the comments from the trial sessions. The reactions noted during the completion of this section are commonly observed in all CV experiments. Responses varied from "*I am a student, do I have to pay for this?*" to "*I would expect such costs to be paid out of Council Tax if provided by local authority*". Others did not respond very well on the percentages expression as they thought that the chances they represented were "*too low to bother by paying*". Some asked "*Do reduce the chances of victimisation for whom...for me...or in general?*", "*Am I directly benefiting from this?*", "*Is it my victimisation that you are referring to or the community's?*" Some felt that it was "**unfair**" to pay anything because *"I had paid taxes before and I believe that it was*

already too much to pay for services that the police fails to prevent" and protested with a zero amounts. However, such refusals were expected considering the sample in the trials (students do not pay income taxes). Similarly were observed with the question on income, as respondents were not always confident in indicating a discrete monetary amount. The description of the victimisation programme was thought to lack detail and not "convincing" enough to be worth paying for. Participants rejected the idea of the same fee because "*each one of us should pay according to income and earnings"*. Another issue pertained to the voting series on the percentage reductions as reluctance was recorded: "*Why would I vote differently for 20% or 30%?"*, "*If I vote for the programme 10% wouldn't that imply that I would vote 'for' for the rest as well?"*, "*Voting costs nothing, I would vote 'for' for any percentage"*. Thus, one of the reasons for protesting was that the intervals between the offered percentages were too close to each other and confused the respondents.

Another issue was the omission of asking questions that would describe general respondent's characteristics. To some extent, this was because the questionnaire was designed for being piloted with students. However, the revised version expanded on the social and experience descriptors; such as marital and health status, FoC and safety, policing, aversive behaviour and questions on the comprehension of the CV module. Following Schkade and Payne (1993) the revised instrument included two Likert scale questions to rate respondents' confidence and difficulty when answering the CV module ("*Are you confident in your response*" and "*Did you find these questions difficult to answer*").

The final issue concerned the definition of a 'good' answer. During the pretesting procedures, participants frequently asked what properties would constitute an answer correct or valid. The focus groups suggested the use of a reference point before asking respondent's WTP; for example the approximate cost of the implementation of similar interventions or programmes. Although the bias this would invoke did not allow its adoption, the issue was thoroughly discussed between the researcher and the reviewers of the project for the revised version of the questionnaire to address that problem. Thus, aside from amending the wording of the valuation section, a welcoming page was added to the revised version of the questionnaire explaining the purpose of the study and the underlying theory in the simplest way possible.

In all, this stage concluded that the survey was feasible despite the difficulties it entailed. The quantitative work helped in assessing how the responses corresponded to the questions asked and

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the outcomes were used to revise the instrument before being trialled again. What remained to be addressed by the subsequent stage of battery work was to determine and decide the time intervals and the percentage rates that would be incorporated in the CV module. The time intervals refer to whether the use of WTP per month should be used over WTP per year (on the prevention programme) and whether the one payoff rate would be kept for the remaining CV scenarios. The literature is not conclusive on this point as although many opt for the year time span, the monthly terms are more easily conceptualised by the respondents as most of the typical tasks in life are in done in monthly terms (e.g. wages, bills etc). In terms of the reduction rates (10%, 20%, 30%), the subsequent trials would conclude on the most suitable option as evaluating reductions for a series of percentages has never been used in previously published CV research. Typically, studies select one percentage throughout the whole survey when describing specific reduction or another type of offered 'good'.

The second pretesting stage comprised of 28 one-to-one interviews and one focus group discussion. During the interviews, the questionnaire received mixed reviews with the most commonly recorded replies in the question "*What did you think of this questionnaire?*" being "*interesting* ", "*weird*" and "*unusual*". All respondents were clear on what they were asked to do and found the options provided in the instrument clearly articulated. As expected, there were comments as those observed in the first pretesting stage on the WTP questions identified as protests, e.g. "*These should be taken out of taxes","The government is responsible for covering this" "Local council should be paying for prevention programmes as I pay enough taxes already*" etc. Regarding the suitability of the two options describing the prevention programme, both were equally supported (15 opted for Option A and 12 for Option B: see Section B in Appendix 2, §2.2.1). On the choice of the reduction percentages, most respondents noted that they would rather answer the percentages of 10% and 50% reduction; firstly because it was "*easier to conceive*" and second, because the option of three consecutive 10% interval "*did not make any difference*" according to the recorded responses. Option A was also thought to be "wordy" by some of the participants, yet a few of the respondents mentioned that "*Both seem fine*" or "*Doesn't make any difference* ". Given that the responses were gathered only for the preferred option, it should be mentioned that Option A was completed by 13 respondents, of which 10 vote 'for' on the implementation of the programme that would prevent assaults by 10% and 11 by 20% and 30%. Option B was completed by 15 respondents, all of which voted '*for*' the implementation of the

described programme. Similarly, option B received greater support in the question on WTP per month for the implementation of the programme, as it was thought to be more clearly articulated. In addition, respondents rejected the idea of "set amount" suggested in Option A mentioning that Option B provided a more concise description of what was being asked. All respondents voted against the implementation of the prevention programme when the tax raise was employed as the payment vehicle. Notably, respondents were more eager to respond with an actual monetary value when a concrete mode of payment was not employed. Although all respondents selected a most preferred option, only 18 respondents provided a concrete monetary amount. Although no descriptive statistics were calculated, it should be mentioned that WTP per month ranged from £0 to £60, according to the reduction each time described.

Surprisingly, 50% of the respondents voted against providing victims with monetary compensation. Some reasons recorded are quoted here: *"That way people will try to try to make money out of it", "This means that I will have to pay more for the program to keep going", "Government should pay such compensations not prevention programmes"* etc. The lack of "*Do not know*" option was also highlighted and corrected in the subsequent version of the questionnaire. Sixty percent of the responses (17) stated that they would be willing to accept money in compensation in case they were victimised, with the majority opting for the "*Definitely consider*" option. In terms of assessing compensation based on injury severity 72% (20) voted for option A. However, seven respondents opted for "Somewhat favour", five for "Neutral", six for " Somewhat oppose", one for "*Strongly oppose*" and one "*Many other things should be considered as well other than that*". It was suggested that the question should provide more options as "t*he severity of the injuries is not the only thing to think about when it comes to victims' compensation*".

Regarding the remainder valuation section, respondents were given the revised version of the scenarios A-F with a few modifications. These involved (1) the amendment of the percentages in the scenarios description, (2) the inclusion of a question after each scenario and (3) the insertion of an Option B in three of the remaining questions. The newly added question added after each scenario provided a short description of the psychological distress that would be implied and asked respondents whether this knowledge would change their states values. Although they were not asked for a valuation, they were instructed to keep notes on justifying their answer. The objective was to assess whether the new information provided would more successfully convey to respondents the

intangible severity each outcome. Moreover, the reduction percentages were different from those previously used as the 10% interval between the available options was replaced by 20%. Although the 10% reduction was kept, the 20% was replaced by 30% and the 30% was replaced by 50%. This was done to address the issue of respondents mentioning that percentages were too close in terms of intervals to make an actual difference.

The Option B in the compensation question was added in an effort to assess whether the vehicle of insurance company would lead to higher compensatory amounts. The first pretesting stage showed that respondents found the insurance company easier to comprehend. However, the difference between the numerical results of the second pretesting trial between the compensatory amounts and the WTA in each scenario raised some concerns. Given that WTA and compensation has been equated as a concept in the CV literature (Bateman et al. 2002) -not without controversy though- care should be taken for these values to be in similar ranges. For this reason, respondents were asked to carefully consider the two options and if possible answer both rather than answering only the preferred one. However, this was only achieved in five cases. It was consequently decided that the subsequent pretesting stage would conclude on this issue.

In all, the questionnaire was found to be "*Somewhat difficult*" by the majority of the respondents (53.57%) whereas four respondents rated it as "*Slightly difficult*" (14.28%), one as "*Not at all difficult*" (3.57%), six as "*Very difficult*" (21.42%) and two as "*Extremely difficult*" (7.14%). The confidence in the responses in the CV module were similarly rated; that is "*Somewhat confident*" by twelve respondents (42.85%), "*Very confident*" by eight (28.57%), "*Slightly confident*" by six (21.42%) and "*Not at all confident*" by two respondents (7.14%).

The focus group discussion mainly focused on the issues noted during the completion of the survey material. The survey material included the initial version of the questionnaire as distributed during the one-to-one interviews alongside with the revised version that was constructed after that stage (Scenarios description Options A and B: see Appendix 2, §2.2.2). Revisions included the reworded version of the invitation card and two options were offered in the description of the scenarios A-F were the focus group members were prompted to comment on their preference. Participants were also shown a digital version of the questionnaire in a laptop PC and were prompted to make comments on its appearance and interface. The involvement of the researcher

throughout that part of discussion was moderate as the purpose was primarily to observe how respondents marked the clarity of the information presented and how well they interacted with the electronic version of the instrument. Some indicative comments were "*Really hard to place a monetary value; need a point of reference really*"; "*I would have answered differently if you did not mention that sexual assaults were not included*"; "*In response to the question about policing being the most effective way to combat crime, I think policing is one way to reduce violent crime but there are other strategies that need to be used as well, in combination with policing, such as education and preventative schemes. This was an interesting survey*!".

Overall, the changes introduced to the survey material were well received by the members of the focus group. Regarding the options provided in the CV section, the majority of the respondents opted for the initial one (Scenarios description Option A) mentioning though that as a section it was big and time consuming. All comments were used to revise the survey instrument for improving its intelligibility and comprehensibility.

The think-aloud sessions incorporated the improvements made after the second pre-testing stage and the revised version significantly differed from the previous ones both in layout and question format. The success of the verbal protocol methodology relies on the participants' motivation and ability to verbalise their thoughts, therefore, as Alderson and Banerjee (1996) point out, its use may result in silence if participants lack either of the two. While all participants in these sessions generally seemed interested in the topic, they differed in their ability to articulate their thoughts and explain their choices: some of them commented only on items that they found difficult to understand or answer, while others kept thinking aloud even if the statements were clear to them. As a result, some participants made more comments than others; consequently, the interviews varied in length from 45 to 75 minutes.

The verbal protocols provided the researcher with a significant understanding of how various text features influenced the sated responses. The most important outcome was that the comments of the informants were particularly focused on the layout of the questionnaire rather than the content as was expected. The comments obtained in the completion of the CV module mainly focused on the complexity in stating a concrete value, where as the majority of the respondents commented on the length of the questionnaire, particularly while completing the CV module. No comments were made on the description of the scenarios or the subsequent questions on WTP and WTA. Although the

researcher acknowledged this lack of remarks as a "saturation" point for the CV scenarios in the valuation section, one may interpret this absence of commentary as a lack of understanding from the respondents on the questions they were asked. In the view of this, it should be noted that during the think aloud sessions the respondents were prompted to verbalise their thoughts to further explore the cognitive procedures involved in reaching the values being stated. However, no specific questions were asked as the scope of this stage of testing was not to interview the respondents but to collect information on how they perceived the attributes included in the questionnaire. Since no concerns were raised from the respondents regarding the absence of baseline risk specification and considering that all the monetary amounts stated were in the same range during this trial, there was not any evidence to suggest any misconceptions regarding that particular issue. Instead, comments were focused on the appearance, the format, the spacing and the position of the questions. This can be attributed to the explicit briefing that preceded the experiment, in which respondents were given detailed information on the CV methodology, alongside with examples of previously published research to aid the process of completing the questionnaire. Generally, respondents were able to follow the order of the questions correctly, without difficulties. The comments on the compensation and out-of-pockets losses questions indicated that the specific questions were confusing and respondents were not always clear on how to differentiate amongst the two. Notably, the specific questions were more time consuming and "*harder*" to complete. The fact that the specific questions could not fit in a single page was also commented and the verbalisation process indicated frustration on some occasions.

No particular sensitivity issues emerged from the remainder of the questionnaire. One problem related to the skip pattern, as it was still unclear to the respondents what question to answer next if they did not qualify for the question at that time. Concerns were also raised by the fact that almost all participates noted that they did not find the questionnaire particularly appealing or user friendly. The word "*boring*" frequently came up in the verbalisation process, highlighting the need for implementing drastic changes on the layout. On the other hand, the lack of comments in the CV section pinpointed the intelligibility of the valuation module and provided evidence that the revisions resulting from the previous retesting phases were successful.

The fourth pretesting stage concluded the battery work with the primary aim being define and test the analytical strategy that would be used with the main survey dataset. For this reason, only the information required to describe the answers obtained by the sample was presented in this chapter as a comprehensive review of the methodology and the econometric analysis that were tested using the data collected in this trial will follow in the subsequent chapter. The basic outcome of this testing trial was the familiarisation of the researcher with the dataset, the close examination of the properties of the obtained variables and the successful testing of the methodology adopted in the main survey. This trial also conduced on the definition of 'valid' WTP responses, as it was decided that in the context of this survey, valid would encompass those WTP responses that conform to the economic principles underlying CV research and can be included, within that framework, in the analysis of the benefits from a policy or project. It was also decided that WTP responses that corresponded to the categories of "protests" or "biases" would be classified as non-valid under the following definitions: "Protests" would refer to those refusing to answer the valuation questions (incomplete/ unreadable) and "biases" to those which did not provide their genuine WTP but respond with an unrealistically high value instead. Given that the web-based survey did not allow the occurrence of blank responses, it was decided that non-valid responses would be coded as "missing data".

5.6 Conclusions

Overall, the issues that emerged from the first pretesting stage entailed simplifying the context of the questions where that was possible, rewording and rephrasing the questions and the available options within the questions, eliminating questions of minor importance, revising the structure of the instrument and providing additional information where possible to aid the successful completion.

During the second pretesting stage, respondents showed a significant improvement in the comprehension of the questionnaire and the 'good' being valued compared to the previous trials, hence justifying the inclusion of further information. The time for completion was estimated to approximately 20 minutes excluding the briefing and the brief interview with the respondent. It was made clear that the percentages in the CV module should be kept consistent with greater interval

than the one used in previous trials while skip patterns in the stated responses were identified and addressed. The comments from the interviews provided enough material for the subsequent revision of the instrument pertaining to the layout and wording of the instrument, summarised below:

- Revise the CV scenario description in a more structured way using fewer words if possible.

- Keep the scenarios description in one page when asking on the compensatory amounts and the out-of-pocket losses.

- Discard the questions on the prevention programme asking payment on top of the respondent's activities and decide on a more universally accepted proposal; if that cannot be achieved then do not describe a specific payment vehicle.

- Keep the percentages consistent throughout the CV section to 10% and 50%.

- Consider adding a 100% percentage to the series of percentages as it can be thought as a point of reference and hence aid elicitation.

- Provide concrete skip patterns in the victimisation module by altering the layout of the questions (e.g. introduce boxes and bold fonts).

- Reduce the amount of questions to make the questionnaire sharper and more "inviting" and modify the layout so that it does not look "crammed" with questions.

In the third pretesting stage, the identified issues were tackled as follows:

- The format of booklet was implemented to avoid pages being skipped by mistake and provide a more professional look for the survey instrument.

- Larger font was used to improve the overall appearance and questions were fit to a page with a maximum of 4 questions per page.

- In the valuation module, only one scenario was presented per page.

- Answer columns were inserted were possible to minimise mistakes and colouring was used as an identifier for coding the sections in the questionnaire.

- The skip patterns were clearly distinguished by increasing or decreasing the indent level of the paragraph and multilevel numbering was also applied as appropriate.

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- All instruction questions were placed next to the relevant questions in a different letter font to minimise confusion.

- A covering letter was inserted at the front of the questionnaire, which introduced and welcomed the participants to the survey. The letter included a brief description of the study and encouraged response while highlighting the importance of participation.

The numerical results of the final pretesting trial pinpointed the great diversity in the obtained valuations, which in return highlighted the need for employing a suitable analytical strategy to address the needs of the valuation exercise. To achieve this, the study followed closely the valuation guidelines accredited in the CV literature (Pearce & Özdemiroglu 2002; Bateman et al. 2002; Mitchell & Carson 1989) and concluded on the properties and definition of "non-valid" responses, on the appropriate bounds that should be defined for each observation in the data set and on the analytical strategy that would be adopted in analysing the CV data.

Chapter 6

Valuing costs of violence: The main survey

6.1 Introduction

This chapter presents the stated preferences (SP) survey on valuing costs of violence attributed to physical and psychological injury. This study aimed at gaining a further insight into the personal costs of non-domestic and non-sexual violence, mainly referring to cost incurred through the pain and suffering of the victims. That classification excludes the tangible costs such as those costs incurred by the NHS (medical treatment etc.) or the CJS (police expenditures), as these have already been partly addressed by the Home Office. Instead, the focus of the study was placed on the intangible costs of crime, which potentially comprise the most influential cost category.

This study remedies the lack of available intangible estimates in the UK by applying contingent valuation (CV) techniques on the stated WTP amounts of a UK based sample to reduce the risks of being victims of a violent crime. The theoretical model of the study assumed that the dependent variable, Willingness to Pay, operates as a function of these variables. The selection of those was based on published evidence and would provide a significant aid in identifying the motivations behind individual valuations whilst explaining differences in values across individuals. This study also tests the feasibility of applying non-market valuation techniques to estimate the intangible costs of violence and offers a relatively cost-effective way of structuring and conducting such studies.

6.2 Principal objectives

The main purpose of the analysis was to obtain WTP values as they derive from the stated preferences of the sample population to monetise specific reduction in the risks of being victims of violent crime. The questions presented in the employed CV survey integrated a set of explanatory variables that could influence the WTP valuations and explain variations observed

thereon. The theoretical model assumed that the response (dependent) variable, WTP, is a function of a large set of variables as purported by previous research. In particular, the study aimed to assess(i) whether the value of WTP changes in a group of scenarios is significantly different (higher) from the value of WTP in a subset of those scenarios based on the outcome; and (ii) whether the value of the reductions changes significantly between estimated values.

The objectives of this chapter are outlined below:

- to produce an estimation of how a segment of the population values the risk of victimisation,

- to determine reliable monetary estimations for the emotional costs assigned to a violent assault (using the appropriate estimation techniques),

- to assess the match of the elicited values with the injury descriptors and location preferences,

- to assess the differences in the obtained estimations across the scenarios presented in the survey instrument,

- to specify an appropriate bid function model to describe WTP that conforms with economic theory, and

- to examine the behaviour of specific variables in the econometric model as to their role in influencing WTP valuations.

6.3 Research questions

A number of research questions were developed to guide the implementation of the analysis outlined below:

- How do WTP estimates compare with WTA? Which of these CV approaches provide a more conservative method to quantifying the intangible costs of violence?

- How will the estimates reflect the outcome descriptors?

- How do the WTP values compare across injury types? How do the WTP values correspond to the anatomical location and severity of the injury?

- Is victimisation experience a significant contributor to the elicited intangible estimations? Does the previous experience of victimisation significantly contribute to the WTP values? How?

- Does the income and WTP relationship conform to what is expected based on economic theory?

- Do the covariates in the bid function model follow prior expectations that corroborate with the relevant literature (income, education, FoC, difficulty in the questions)?

The research questions were built upon findings described in the literature further detailed by those described in previous chapters. The characteristics that were expected to significantly contribute to WTP were income, education and FoC; variables typically used in estimation exercises (e.g. Donaldson et al. 1998; Thompson et al. 2002; Atkinson, Healey & Mourato 2005; Amponin et al. 2007). The research also aimed at assessing the relationship between WTP and a number of covariates (e.g. previous victimisation, alcohol misuse, poor health, difficulty in answering the questionnaire) to account for the lack of conclusive information in the literature and to account for any unobserved individual characteristics that might affect the stated values. Furthermore, this research attempted to verify if the assessment of intangible losses approximates that of FoC (FoC diminishes with repeat victimisation: Moore, personal communication); i.e. whether repeat victims value less the losses incurred by the violent incident by habituating to its consequences (see list of variables in Table 6:1).

6.4 Methodology

Many methodological and procedural pitfalls can occur when implementing stated preference techniques due to the complexity of conducting a CV survey. To minimise such issues, prevent misconceptions and enhance the credibility of the study, the reporting of the methodology should also be transparent and comprehensive. All aspects of the research were scrutinised and approved by the Dental and the NHS Local Research Ethics Committee (see §5.3.1-3). The first

part of this section reports on the study's basic properties and describes the implementation mode, whereas the second outlines the steps of the analytical strategy used for the data analysis.

6.4.1 Data and sample: Survey design

In CV surveys, it is customary to collect a fair amount of additional qualitative and quantitative information alongside with the stated monetary preferences and valuations. These questions aim at measuring respondents' attitudes and perceptions related to the subject of interest and consequently help the researcher explain and validate the stated valuations. Fishbein and Ajzen (1975; cited in Bateman et al. 2002, p.147) justified this via the 'theory of reasoned action' which explains that attitudes are "*a function of a person's socio-economic characteristics, personality traits and set of beliefs*" and can hence foretell behavioural intentions such as the expression of a hypothetical WTP. Subsequently, the analysis entailed the investigation of the perceptions and attitudes of the population sample towards the risks of being victimised as this information would help in identifying the motivations behind individual valuations and would explain differences in values across individuals.

The summary of all the variables that were used in the survey to describe the sample was presented in two subsections: (i) the socio economic characteristics and (ii) the uses and attitudes of the sample. The information in the first subsection was vital for assessing the representativeness of the survey sample as it presented the samples' demographic profile and the second summarised the main variables of this category and explored the relationship between variables of interest (e.g. correlations between attitudinal and use variables). Where possible, both subsections presented data breakdowns to identify groups of interest (e.g. victims and non victims, alcohol users and non-). The set of the questions on uses and attitudes did not directly ask for WTP valuations but instead provided vital information that pertained to the subsequent analysis as these were subsequently used to explore the underlying factors behind respondents' values. There is no consensus in the literature to suggest a strict categorisation between the variables that describe demographic and attitudinal characteristics; hence, some overlap between the two subsections is expected.

The attitudinal questions regarding compensation were strategically inserted in the valuation section of the survey instrument as such a structure would engage respondents in the topic of

interest and helps them think about the different aspects of the 'good' being valued while it would encourage them to further investigate their preferences about it (Bateman et al. 2002). As noted in Chapter 3, Question 10 aimed at examining respondents' attitudes towards the notion of compensation. Respondents were asked to identify the most important feature when working out victim's compensation, whereas the OE option was available to prompt the participants to state their opinion if none of the available options was representative of their personal preferences. The analytic process for the collected qualitative material involved examination of the written responses line by line for emerging themes (Miles & Huberman 1994), which were then coded into core categories on the basis of the frequency they occurred.kjh

6.4.1.1 Population and Sampling strategy

RECRUITMENT

Participants were primarily Cardiff residents, including CU staff and students. The recruitment was done using a number of screening questions in the AskCardiff Survey in July 2011. The AskCardiff Survey (formerly Council Services Survey) has been ongoing since 2002 and is carried out by the Cardiff Research Centre, on behalf of the Cardiff Council. It is undertaken on a bi-annual basis and questions 10,000 households across Cardiff on issues such as housing, local communities and views on Council services. Seven screening questions (see Appendix 3, §3.1) were inserted on behalf of this study to the Community Safety module of the July 2011 survey where amongst others; respondents were asked whether they would be interested in participating in this study. Those that provided an affirmative response were prompted to provide their email or home addresses for further communication. Three hundred and thirty nine affirmative returns were received equating to a response rate of 38.5%[57]. An invitation was sent by email and post to all of the respondents who indicated that they would wish to take part in further work with the project on the 14th of October 2011. The invitation comprised a cover letter and included the live url of the survey. A follow-up was sent a month later on 11th of November 2011, which was designed to serve as a combined reminder/thank you rather than to overcome respondent

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[57] In total 1,024 completed questionnaires were returned by respondents in the July 2011 AskCardiff Survey (response rate 18.5%) from which 827 completed the Community Safety module. All questions in the survey were optional.

resistance. A second and final follow-up letter was sent on the 16th of December 2011addressing non-respondents only, stressing the social usefulness of the survey and the individual's importance to its success while stating appreciation.

Only 98 responses were received by the end of November 2011, equating to a response rate of 28.9% (see Figure 6:1). The response rate was higher than expected but the number of complete responses was not sufficient for a CV experiment. This was foreseen during the battery work and comprised the reason for carrying out the final field pilot using an alternative recruitment technique, which involved the use of CU's Internet network. Following the same recruitment mode to the last pretesting stage, the final approach of the respondents was done by the means of web and hard copy adverts, circulated within CU. This involved the use of bulk blind email invitations, adverts in the Cardiff portal Announcement table, tweets through @CardiffDental, A4 posters in CU libraries (Herbert Duthie, Trevithick, Aberconway, Brian Cooke), cards and two posters in Cardiff's Student Union. The advertisement initiative was launched on 24th of November and was ongoing for four months, up until the survey was closed on the 20th of February 2012. An alternative format was also made available upon request to avoid losing willing respondents who preferred pen and paper (via post or fax). However, no hard copies of the survey material were sought throughout the conduct of the survey.
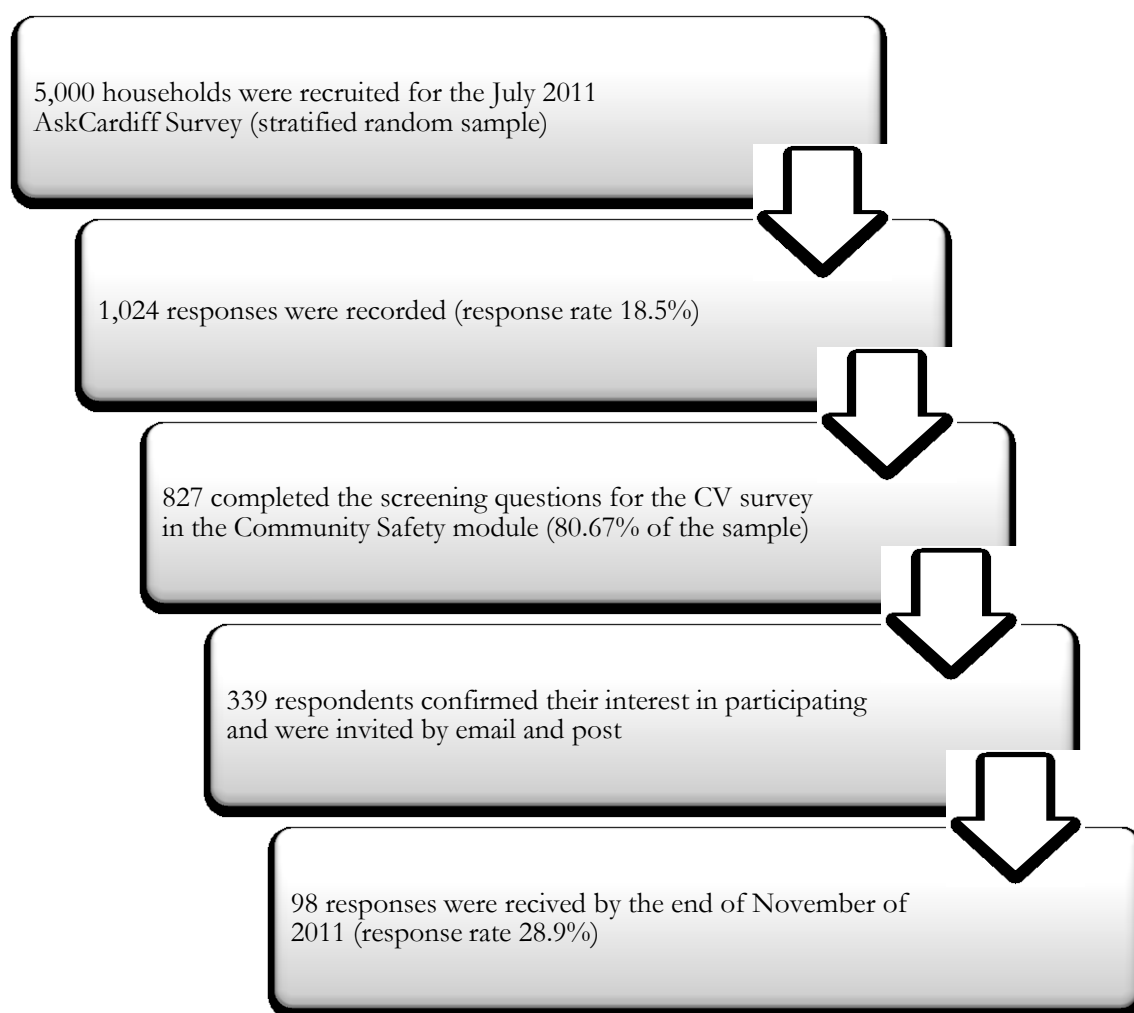
Figure 6:1 The AskCardiff recruitment process

SAMPLING STRATEGY

All Cardiff residents aged 16 year and over, with access to the means described in the *'Recruitment'* section during the 5 months period from the launch of the survey, formed the sample frame. The period of 5 months was estimated to give an adequate sample for the purposes of data analyses, given the response rate of the field pilot conducted during the pretesting stages. In addition, the time limitations applied to the project did not allow for more flexibility. In terms of sample size, a detailed calculation follows in subsequent section. Briefly, the study aimed at collecting a minimum of 250 usable responses. A prize draw of £100 and £50 shopping vouchers was used as an incentive to complete the survey.

The described communication procedures define a form of convenience sampling. The main drawbacks in convenience sampling are sampling bias and that the sample cannot be deemed representative of the entire population. The first implies the likelihood of a systematic, constant difference between the results from the sample in the study and the theoretical results from the entire population. The second refers to the limitation in generalisation and inference making about the entire population. Given that the survey's target population was Cardiff residents, the means available for conducting the study did not allow for any other way of defining a random sampling strategy or framing any other probabilistic sampling scheme. The inclusion criteria refer to the participants' age (16+), literacy in English and access to the communication means. Funds or other resources for the production of a Welsh version of the survey were not available; hence, it was assumed that those who have difficulty in communicating in English would ignore the survey invitations. Additional institutional ethics approval for this survey was not sought, since the project had already been exempt.

6.4.1.2 Sample size calculation

Given the large variance expected in the WTP responses, it is typical practice in contingent valuation studies to employ large sample sizes (Mitchell & Carson 1989). The extent of the variance is attributed not only to CV method, but also to the diversity of opinions in heterogeneous populations such as this.

In Bateman et al. (2002, p.109: Eqn. 3.2) and Mitchell & Carson (1989, p.224: Eqn. 10-2), the likely magnitude of the relative error (the percentage deviation from the true mean) is denoted by the coefficient of variation V. That is calculated prior to the analysis as $V = \sigma / \overline{TWTP}$, where σ is the standard deviation of WTP responses and $\overline{TWTP}$ is the true (the population mean) WTP. Bateman et al. (2002, p.109: Eqn. 3.3) and Mitchell & Carson (1989, p.225: Eqn. 10-3), describe the samples size formula as

$$N = \left[Z \hat{V} / \delta \right]^2 = \left[Z \hat{\sigma} / \delta \overline{RWTP} \right]^2,$$

where N is the sample size, V is the coefficient of variation, Z represents the critical value for t-statistic, σ is the estimated standard deviation to the WTP responses, $\overline{RWTP}$ is the mean of the estimated WTP bids and δ is the percentage difference between the $\overline{TWTP}$ and $\overline{RWTP}$.

In this case, the lack of prior estimates dictated the use of standard values as follows. The coefficient of variation V in CV experiments typically falls between 0.75 and 6, where values of 2 or more are advised (Mitchell & Carson 1989), thus V was set to two. Bateman et al. (2002) suggest that reasonable values for δ lie between 0.05 and 0.3; thus δ was set to 0.25 as the possible percentage deviation of $\overline{RWTP}$. The value of α was set at 0.05 indicating that 95% of the time, the estimated WTP ($\overline{RWTP}$) will be within δ of true WP ($\overline{TWTP}$). Hence, the critical value for the t-statistic was set to 1.96 (the 95 per cent confidence interval).

The calculation outlined above suggests that a sample size of n=246 is adequate for an analysis with power level of α=0.05 and a coefficient of variation of V=2. This result corroborates with evidence in the literature (Mitchell & Carson 1989; Pearce & Özdemiroglu 2002; Bateman et al. 2002) where 250 responses comprise the adequate *minimum* for a CV experiment with an OE elicitation question format. Hence, the study aimed at obtaining at least 250 usable responses.

6.4.1.3 Instrumentation

The survey material comprised the web application of the questionnaire, the invitation covering letter and the participant information sheet. The web application of the survey replicated the one created for the field pilot with a few minor wording revisions. Materials, screenshots and details of the application's interface were discussed in Chapter 5 and attached in Appendix 2 (§2.3).

6.4.1.4 Survey process

The web-based application for the survey was created on the 1st of October 2011. Following the pretesting procedures, the Bristol Online Surveys (BOS) service was used for the deployment of the survey under the standard CU theme. The pretesting process did not reveal any technical difficulties or issues regarding the interface of the application; hence, no problems were expected

or recorded during the implementation of the survey. However, the application and the url link were tested by the researcher in a number of different browsers, operating systems and internet connection types prior to any contact with the participants. The time estimated for completing the online survey was between 20 and 30 minutes.

The survey was launched on the 9th of October 2011 and closed on the 20th of February 2012. The data collection began after the invitations were posted on the 14th of October. In addition to hard copy invitations, participants received a personal email message stating the purpose of the survey, who was conducting it, the estimated time required to complete it, the url of the survey and the researcher's contact details. The e-mail messages originated on the CU server and were sent through the secure SMTP mailer program provided by CU. Upon receipt of the invitation, participants could begin answering the survey. The main survey page was also advertised in the CU network. Throughout the survey, if a respondent did not qualify for a specific question based on previous answer, skip was performed automatically. The web-based instrument was designed to prohibit multiple or blank responses by not allowing the participant to continue without first correcting the response error. This was done to secure a full set of responses from all participants. Semi-complete questionnaires were automatically discarded.

6.4.1.5 Ethical considerations

Given the format of the survey and the approach to the respondents, informed consent was implied by participation. The participant information sheet that was attached on the first screen of the survey and the welcoming letter that preceded the survey questions fully informed participants on the survey and the completion time. It was clearly stated that participation was voluntary and that by filling it, the participant consents to participate, without waving any of their rights as research participants. The follow up invitations aimed at enhancing participation and did not provide recipients an onus towards participation. In terms of confidentiality, the present research fully complied with the Caldicott Principles as the obtained data were fully anonymised and no identifiable information was collected for the purposes of this research.

There were no personal risks involved in this study and no questions were involved that in any way deliberately misled the participants. The battery work demonstrated that risks to participants were minimal as there were no adverse incidents in any of the interviews or the questionnaire

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completion carried out in pilot and preparatory work. Furthermore, the ethics appraisal procedures did not identify any issues that pertained to that matter. Hence, no realistic risk of experiencing either physical or psychological distress or discomfort during the completion of the questionnaire was expected. However, participants were free to withdraw at any time; in that case the only action they would need to take was to either ignore the survey invitation or close the survey application. In addition, participants were prompted to contact the researcher for further assistance in case they felt upset after completing the questionnaire. The survey included all necessary contact information (name, telephone number & email address) at both the first and the last screens of the survey, to enable further contact with the researcher if required. No conflicts of interest were declared.

6.4.1.6 Management of the research

Only the researcher managed the research as the specialised nature of the instruments did not allow for consumer involvement. The url of the survey was valid for a predefined period that equated a total of five months. As soon as the survey was closed, all responses were transcribed in an .xlsx workbook. This file was password-protected and stored on a secure PC in a locked office on CU premises. Only the researcher and the supervisory team had access to this information and participants were known only by their identification code.

6.4.2 Analytic Strategy

The two main aims of the analysis of the CV data were (i) to construct mean and median values for the collected WTP/WTA responses alongside their associated confidence intervals, and (ii) to estimate a bid function to test that responses have a distinguishable structure and conform to prior expectations and economic theory. The WTP analysis followed methodologies of previously published SP studies (Donaldson et al. 1998; Zarkin, Cates & Bala 2000; Krupnick & Alberini 2002; Marra et al. 2005; Atkinson, Healey & Mourato 2005) and the analytical strategy outlined in this section was adopted from the works by Pearce and Özdemiroglu (2002), Bateman et al. (2002) and Mitchell and Carson (1989). Ideally, WTA would be analysed under the same framework. However, in the context of this study the primary focus lied in WTP

whereas WTA served comparison purposes. In addition, the lack of applicable formative bounds and utility context in the described scenarios did not justify the econometric modelling of WTA. For those reasons, the WTP figures reported here were simply averaged to produce an estimate of mean WTA followed by their corresponding 95% Confidence Intervals.

Thus, simple statistics were employed to describe a large number of valuation data. This included the WTA amounts, the ranking of the scenarios and the valuations regarding the out-of-pocket losses paid for coping with the consequences of the described scenarios (Q8[58]) and the corresponding desirable compensation (Q9[59]).

The valuations regarded as 'out of pocket' losses denote tangible costs resulting from the scenarios and do not necessarily include compensation for intangible losses while the question (Q8) was framed to ask the respondents to value the losses incorporated in the scenarios if they were the actual victims. On the other hand, question 9 asked for the valuations respondents suggested as an adequate compensation for victims (other than themselves) that suffered the outcomes described in the scenarios. Hence, question 9 clearly distinguishes respondent from being the victim and prompts for a more universal value. Consequently, the elicited values were expected to greatly differentiate from those retrieved from question 8 as respondents did not have the limitation of "ability to pay" as previously, given that the source for providing this metric would not be their own.

As discussed in the preceding Chapter, the reason for including these additional questions was to not only to compare WTA with WTP but also to some other similar measures, which encompass the element of compensation without mentioning WTA. The aim was to provide evidence to support the hypothesis that WTA is not necessarily equivalent with compensation as notion. Assuming that emotional costs are approximated by the absolute difference between monetary expenditures and compensation for both tangible and intangible losses, then the definition below can be used to derive at the values presented in Table 6:7.

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[58] Q8. We now want you pretend that you have actually experienced the harms described in each scenario. How much do you think you would need to spend coping with each of them? The sort of costs you might want to include are lost income through sick leave, psychotherapist visits, cosmetic surgery, job loss, shopping therapy, holidays, etc. As you answer this question, please consider the emotional and psychological distress caused by each of the scenarios and do not include medical costs covered the NHS. We are only interested in your personal costs.
[59] Q9. Now we would like to know your opinion on how much victims should be paid in compensation for their pain and suffering for each of the above scenarios.

$$Intangible\ costs_i := |compensation_i - expenditures_i|$$

An alternative way of assessing the same hypothesis derives from comparing of the WTA values with those denoting out-of-pocket expenditures and with the WTP values for completely preventing each scenario. Considering that Question 8 did not directly ask for the emotional cost but was capped by respondents' 'ability to pay', while Question 9 tackled the notion of compensation which does include the psychological distress, their absolute difference could be used as a proxy for the emotional costs underlying each scenario. The definition above with the appropriate substitutions from the information retrieved from the survey translates to the absolute difference of WTA and out-of-pocket expenditures (intangible costs type II), and the absolute difference of WTA and WTP for complete scenario prevention (intangible costs type III). Altogether, the intangible values calculated are summarised below:

$$
\begin{aligned}
TYPE\ I & := |Compensation\ -\ Expenditures\ | \\
TYPE\ II & := |WTA - Expenditures\ | \\
TYPE\ III & := |WTA - WTP\ for\ complete\ prevention\ |
\end{aligned}
$$

Wilcoxon rank-sum test was used to assess mean differences between the derived values. However, the main interest lied in the numerical difference between the values denoting 'real' monetary expenditures and the compensatory amounts.

6.4.2.1 Preliminary steps

6.4.2.1.1 CODING & DATA TRANSCRIPTION

All questions were initially coded in a way that allowed for each response to be represented by a binary variable. Obtained data were firstly inserted to a Microsoft Office Excel Worksheet (*.xlsx*) and then appropriately transformed into a *.dta* file. Further coding and analyses were conducted with STATA SE11. Some of the statistical techniques were implemented in the R environment (R DCT 2011). The preliminary steps of organising the survey data included creating new variables and arrays, recoding and renaming already existing variables with their appropriate labels, values, notes and properties, encoding string variables with meaningful

nonnumeric text (e.g. male, female) to the equivalent numeric variables with labels, and converting string variables with meaningful numeric text (e.g. 1, 2) to the equivalent suitable numeric variables. All changes were merged into a new dataset, which was used for the subsequent analysis.

6.4.2.1.2 SUMMARISING THE DATA

The first step of the analysis was to summarise the data collected in the survey. The most parsimonious methods were used, employing univariate and bivariate statistics, whereas graphical representation supplemented the reporting when possible. Individual level analysis was also carried out before aggregating to assess the characteristics of the outliers that would be in a later step restricted from the sample (see Appendix 3, §3.3). Responses were examined on an individual basis to assess if the outliers for the different outcomes were always from the same respondents. Friedman chi-square test was carried out with all WTP data to assess the agreement in the rank ordering of WTP across respondents.

6.4.2.1.3 IDENTIFICATION & MANAGEMENT OF NON-VALID RESPONSES

The next step was the close examination of the CV data in order to establish which responses should be treated as valid WTP reflections. In this context, the word 'valid' denotes WTP responses that conform to the economic principles underlying CV research and can be included, within that framework, in the analysis of the benefits from a policy or project. Typically, non-valid responses are considered those that refuse to answer the valuation questions, provide zero valuations, or instead of providing genuine WTP respond with an unrealistically high value (Bateman et al. 2002).

Considering the above, the online survey restricted blank responses whereas the remaining non-valid responses were classified as "protests" or "biases" and coded as missing following the definition adopted in the web pre-test. However, respondent was able to provide non-numerical responses as these could not be controlled in the web-based application. Zero valuations were allowed as the context of the survey and the nature of the questions asked constitutes those valuations genuine. That is because zero valuations may well reflect respondents' viewpoints to aspects of the CV scenario (e.g. being asked to pay for the something that they believe is not

important/worth it). It is expected some respondents refusing to pay/providing zero valuations not due to protesting but due to undermining the importance of what is being valued. The deletion of zero valuations would weaken the analysis in terms of the required sample size while it would bias the WTP calculations on scenario being evaluated. Unrealistic high values were treated as non-valid and coded as missing. This was done to maintain the remaining information provided by these responses, as in deleting observations the reduced sample may differ significantly in its characteristics from the unadjusted sample.

6.4.2.1.4 APPLICATION OF FORMATIVE BOUNDS

To ensure that the responses to the WTP questions are consistent with welfare economic theory, appropriate bounds were defined for each observation in the data set. In terms of WTA, no theoretical bound can be set on the admissible values, as there is no theoretical limit to the compensatory amount identified by an individual. The lower bound in this survey was set to zero in all responses, to restrict negative WTP valuations. For the upper bound for WTP, the standard norm applied refers to respondent's uncommitted income since one can only pay as much as (s)he can afford (Bateman et al. 2002). The battery work indicated that the most suitable upper bound that would constitute a reliable type of discretionary income and hence a valid measure of ability to pay would be the annual net income, as calculated from the stated monthly income. It should be noted though that this was a conventional bound, as it does not explicitly abide by the economic theory given that it does not consider welfare measures such as overdrafts, mortgages and (bank) loans.

6.4.2.2 Estimation of WTP & econometric estimation of the bid function

The estimation of the mean and median values of WTP was the principal objective in this analysis. The mean and median WTP respectively refer to the average and to the value of WTP at which exactly 50% of the sample has a lower WTP and 50% have a higher WTP. There is a dispute in the literature regarding which measure of central tendency best represents the average valuations. This study opted to report both measures of central tendency for three main reasons: first that they both provide complementary views of the data fit; second that neither is innately superior, and third that they have quite different interpretations each time based on the context

of the valuation exercise. For example, in cost benefit analysis if the mean WTP for benefits outweighs costs, this suggests that the project should proceed. Notably, in this study where the context is more of a public choice, the median value is more relevant since it corresponds to the amount which would receive the majority of support.

The sample average is the most efficient estimator of the true population mean only if the distribution of WTP is a normal. Despite this remains a valid way to estimate the true population mean, CV data CV data represent hypothetical evaluations that are not typically normally distributed and cannot be regarded as such given that the normal distribution allows negative values and assumes median and mean to be equal. In addition, after imposing the formative bounds the WTP data become censored values, which inversely contradict any normality assumptions. Thus, to avoid restrictions due to functional form and regardless of the elicitation technique, literature acknowledges a twofold estimation framework for the estimation of WTP (see e.g. Mitchell & Carson 1989; Bateman et al.2002, Haab & McConnell 2002), according to which mean and median WTP values should be calculated using non-parametric and parametric techniques. The first develops survivor curves illustrating the likelihood of agreeing to make the hypothetical donation as a function of how much the respondent is willing to contribute. These survivor curves directly demonstrate individuals' responses and are used to estimate the mean WTP as the integral of the survivor function (the area under the curve). They creates an additional reason to conduct non-parametric analysis as they provides the means for assessing whether respondent bids follow the basic premises of consumer theory (e.g. falling demand with price). The parametric approach estimates the WTP mean using maximum likelihood techniques and although the parametric estimate of mean WTP is more statistically efficient, it requires an a-priori specification for the WTP distribution. Similar to the decision for reporting both mean and median and considering the 'good practice' guidelines in the literature, both estimation techniques were employed. In the same vein, Pearce and Özdemiroglu (2002, p. 69) note "*the distinction is less important than the fact that they both provide complementary views of how the data fits the [parametric/non-parametric] model*". Each estimation exercise is detailed below.

6.4.2.2.1 NON-PARAMETRIC ESTIMATION

As previously discussed, all data collected from CV surveys, regardless of the surveys' context, reflect values placed by the respondents on a hypothetical market rather than tangible economic transactions. This raises issues with regard to whether the elicited values conform to the economic principles underlying CV research (e.g. consumer theory states that price increase follows declining demand). To tackle this issue, literature suggests the use of non-parametric techniques on the CV data prior to the econometric analyses as this allows the direct assessment of the response to price from the obtained data (Thompson et al. 2002; Bateman et al. 2002). In addition, non-parametric estimations facilitate the final interpretation of the results for two main reasons. First, because they require the least assumptions about the nature of the WTP data and second because the resulting mean/median WTP provide the minimum values for these metrics that is consistent with the sample data (Pearce & Özdemiroglu 2002).

The nonparametric technique for analysing respondents' WTP is to develop survivor curves showing the likelihood of agreeing to pay the hypothetical amount as a function of the stated WTP amount, that is, as a function of how much the respondent is willing to pay. Thus, for each WTP stated amount one could calculate the percentage of respondents who were willing to pay the specific amount. Apart from providing WTP lower bounds, the survivor curves can also be used to examine whether respondents valuations are following the expectation of consumer behaviour; i.e. the likelihood of a respondent stating a specific amount decreases as the amount increases. Parametric estimation requires the assumption that the data of interest approximate a specific distribution. Since WTP here is asked by the means of OE questions, the obtained responses comprise continuous data, highly skewed with a large number of zeros. To overcome the obstacle of the distributional assumptions in estimating the parametric WTP distribution, non-parametric estimation was initially employed.

Unlike parametric, non-parametric estimation eliminates all fixed assumptions of distribution and functional forms (Greene 2002) and has been considered a "distribution-free" (Abdullah & Jeanty 2009) less restricted approach to estimating WTP (Haab & McConnell 2002). Bateman et al. (2002) suggest an empirical approach to estimating the survivor function of WTP responses, in which the continuous curve defined by parametric specifications is replaced by an "*untidy-*

looking step" function (p. 226). Considering that all obtained valuations were continuous data, the Kaplan-Meier (KM thereafter) estimator would provide an easily interpretable step function and would validate the survivor function resulting from the estimation procedure. In a valid KM survival function reflecting WTP data the probability of 'surviving' is never increasing as the WTP amount increases as "[...] *the function is being traced out from a series of vertical steps taken at each successive WTP value where the height of the step is determined by the number of respondents returning this value as their maximum WTP*" (Bateman et al. 2002, p. 228). The curve is a plot of the KM estimate of the survival function and illustrates a step function that drops at the time of each event. Following previous mathematical notations, each distinct WTP value is denoted by C_j (j=0 to J) so that C_0 will equal zero and C_J will be the largest WTP value in the sample. The estimate of the survivor function evaluated at a WTP of C_j is calculated by computing the number of responses with a WTP greater than this amount and expressing this portion of the total number of responses in the sample. Given that the bounds were set to zero up to the individuals annual income, *Prob (y=1)* →*0* and *Prob (y=0)* → *anincome $_i$*, where i denotes the individual. That is, for the highest WTP value in the sample (C_J), the probability of someone returning a value greater than this amount falls to zero. Thus, each of the largest WTP values in the data corresponds to a point estimate of the survivor function. Each of these points is accordingly plotted on a graph and jointed together to form the continuous KM survivor function. The resulting plots have a stair-step pattern because the survival probability at some points is unknown. By convention, the survivor function remains constant at the probability associated with C_j (i.e. $\hat{S}(C_j)$) hence the survival probability for these values (successive observed WTP values C_j and C_{j+1}) are assumed to equal the survival probability of the closest value that is still smaller.

6.4.2.2.1.1 Mathematical notation

Considering the above, the non-parametric specification of the WTP disregards any ad hoc parametric assumptions and uses the survivor function for estimating the mean and median WTP values. The survivor function is a non-parametric representation of the distribution of WTP, denoted $S(z;\cdot)$, where the symbol z is a random variable denoting the individuals' WTP (in the rest of this exposition this will be referred to as C as there is no need for the further use of a random variable). In addition, literature suggests that the non-parametric estimates provide

the most parsimonious WTP values, as it provides the lowest value of the value of the maximised log likelihood function consistent with the sample data (Pearce & Özdemiroglu 2002; Bateman et al. 2002).

The non-parametric estimation of the WTP distribution was achieved using the Kaplan-Meier product limit estimator (KM hereafter); a decision guided by the continuous type of the obtained data. The KM estimator produces a stepwise survivor function where each step denotes the probability of observing a WTP greater than a particular value. This was achieved by putting the WTP responses from each scenario in ascending order and calculating the proportion of the sample that have a WTP greater than each value (Bateman et al. 2002). The steps altogether trace out the survivor function of the WTP. The mathematical notation follows, adopted from Bateman et al. (2002).

Let $N: n \in \mathbb{N}^+$ denote the total number of observations in the sample, $J: j \in \mathbb{N}^0$ the total number of valuations and $C: C \in \mathbb{R}_{\geq 0}$ the obtained WTP amounts in descending order. Then each distinct WTP value is denoted as C_j, where C_0 will always equal zero and C_J will be the largest WTP value in the sample. If the survey returned a unique positive valuation for each individual in the sample, it would be implied that $J = N$. Typically though, some valuations are observed more implying that $J \leq N$. If h_j denotes the number of responses in the sample with a WTP of C_j; then the total number of responses in the sample with WTP greater than C_j is:

$$n_j = \sum_{k=j+1}^{J} h_k. \tag{1}$$

An empirical estimation of the survivor function at each of the C_j can be calculated as:

$$\hat{S}(C_j) = n_j/N , \quad j = 0 \ to \ J. \tag{2}$$

According to this definition of the survivor function, each j denoting an individuals' WTP value corresponds to a point estimate in the survivor function and each step of the function is the calculated by dividing the number of WTP responses greater than the corresponding amount by the total number of observations in the sample, N. In other words, the *j-th* point estimate of WTP (C_j) is expressed through a fraction with the number of WTP observations that exceed C_j being the numerator and the total number of observations in the sample the denominator.

Accordingly, if C_J is the highest WTP value in the sample, its survivor function value, $\hat{S}(C_J)$, will be zero.

The mean and median WTP values are directly obtained from the survivor curve. The median is the WTP value at the ψ-th point, $\widetilde{C_\psi}$, at which equation (3) solves to 0.5:

$$\hat{S}(\widetilde{C_\psi}) = 1/2 \;\Rightarrow\; \widetilde{C_\psi} = S^{-1}(1/2). \tag{3}$$

The mean WTP value is the area bounded by the graph of the survivor function. This area amounts to the integral of the survivor function, $S(z;\cdot)$, between the lowest and the highest possible value of WTP (respectively zero and infinite for this definition) according to:

$$\bar{C} \stackrel{\text{def}}{=} \int_0^\infty S(z;\cdot)dz . \tag{4}$$

Adopting the conservative approach suggested by Bateman et al. (2002, pp. 227-8) it is assumed that "[...] *between successive observed WTP values (i.e. C_j and C_{j+1}) the survivor function remains constant at the probability associated with C_j, that is $\hat{S}(C_j)$*" and consequently the equation (4) transforms to:

$$\bar{C} = \sum_{j=0}^{J} \hat{S}(C_j)[C_{j+1} - C_j]. \tag{5}$$

6.4.2.2.2 PARAMETRIC ESTIMATION

As previously discussed, the parametric estimation does not come without assumptions. First, the parametric results are heavily influenced by the distributional assumptions made during the analysis given that the parametric estimation requires a type of a-priori selection of the probability distribution according to which the WTP is distributed in the population. Second, the parametric model uses responses from the survey to judge exactly how different factors, such as income, educational attainment or previous victimisation experience, influence the individuals'

WTP. The objective of the estimation exercise is to find the parameters of the assumed probability distribution function (Bateman et al. 2002).

Since the WTP is distribution is skewed and strictly non-negative a lognormal distribution was employed to model the WTP data. The full theoretical model (see eq. 11) assumes that the individuals' WTP is the dependent variable which operates as a function of a set of variables that conform not only to prior expectations stated by the existing literature (e.g. age, low education, FoC) but also to economic theory (e.g. ability to pay denoted by income). In essence, the parametric technique estimates the function that best describes respondents' preferences and allows the calculation of the WTP values given the estimated parameters (Amponin et al. 2007).

The estimation of parametric mean and median WTP values requires the estimation of the parameters of the model which maximise the total likelihood of observing the reported WTP values. Hence, Maximum Likelihood Estimation techniques were applied to establish the set of parameters that best fit the data and maximise the total likelihood of observing reported values. As previously noted, the aim of applying MLE techniques is to find the probability p of obtaining the WTP values observed in the sample based on the independent variables incorporated in the model. Assuming that WTPi follows a lognormal distribution, the probability p is denoted as a function of the location (μ) and scale (σ^2) parameters of the lognormal distribution. The process is briefly described in three steps; first taking the logarithm of the likelihood function, next the derivatives with respect to the distribution parameters and finally set the system of the derived derivatives equal to zero and solve for the distribution parameters. The solution yields the maximum likelihood estimates as presented in (21). Simply put; the MLE provides with the most likely values for the regression coefficients. The maximisation yields the optimal values of μ and σ^2, which are then used to calculate the mean and median WTP values. After correcting for the inclusion of zero valuations, the mean and median are estimated according to the formulas presented in (23).

6.4.2.2.2.1 Mathematical notation

The parametric estimation is a probabilistic technique wherein a probability is assigned to observing a particular WTP; i.e. it entails the assumption of a probability distribution according to which WTP is distributed in the sample population. The probability distribution is a function

that generally describes the likelihood of a random variable, z, taking certain values. Typically, a parametric distribution is defined by two functions, the probability density function and the cumulative density function. These functions describe the shape of the parametric distribution using the numerical parameter that a parameter that index the selected family of probability distribution. In modelling applications of CV data, the most frequently employed probability distributions are characterised by two parameters, namely the location (μ) and scale (σ^2) parameters. According to the probability theory the location parameter denotes the central point of the distribution (i.e. determines its central location on the horizontal axis) and scale parameter determines the spread of the distribution (i.e. the larger the scale parameter, the more spread out the distribution). For example, the location parameter of the normal distribution corresponds to the mean of the distribution and the scale parameter corresponds to the standard deviation of the distribution[60].

Unlike the non-parametric, the parametric estimation does not solely rely on the WTP data but also on how the rest of the obtained data relate to WTP and hence allows the integration of respondent characteristics in the model estimation (Haab & McConnell 2002). This is achieved by the means of a mathematical equation, known as bid-function, which describes the relationship between WTP and other factors such respondent's income and other socio-economic variables, which are assumed to influence respondents' valuations. In effect, the bid function is a directly specified regression equation in which the exogenous factors (income and the other variables) explain the variation in WTP response while allowing for the calculation of the WTP given the estimated parameters (Amponin et al. 2007). Hence, the parametric model uses responses from the survey to judge exactly how different factors, such as income, educational attainment or previous victimisation experience, influence the individuals' WTP. The use of these covariates also aids in assessing the validity of the obtained estimates as it is later used to verify priori expectations that conform to the economic theory (Haab & McConnell 2002). Bateman et al. (2002) add that there are three main objectives that the bid-function serves aside the estimation of the mean and median WTP values; (i) to test for potential associations between the WTP values and the experimental variables provided by the questionnaire, (ii)

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[60] The normal distribution is symmetric such that the location parameter μ defines both the mean and the median of the distribution.

examine the existence of distinguishable patterns in the data and (iii) verify whether these patterns conform to prior expectations.

Considering the above, the parametric estimation of WTP relies on two issues: first the selection of the parametric distribution, which will be used to model the data from the CV survey and second, the selection of the parameters that will be used for defining that model. To put the theory in the context of WTP, assume that WTP follows the parametric distribution and let a random variable z denote WTP. Then, $P(z)$ denotes the probability of WTP and $P(z=WTP_j)$ refers to the probability that the random variable z is equal to a particular value of the WTP distribution (WTP_j). The probability distribution is given by an equation that links each outcome with its probability of occurrence. This equation is known as the Probability Density Function (PDF hereafter). The PDF of the probability distribution is denoted $f(z; \mu, \sigma^2)$ and gives the probability that a respondent's WTP will take a value of z given the location and scale parameters of the distribution (μ, σ^2). The cumulative probability refers to the probability that the value the random variable z falls within a specified range; i.e. to the probability that z is less than or equal to WTP_j, that is $P(z \leq WTP_j)$. The equation of the cumulative probability is known as the Cumulative Density Function (CDF thereafter) and describes the probability a respondent's WTP will take a value of z or less given the parameters of the distribution. The CDF of the probability distribution is denoted $F(z; \mu, \sigma^2)$.

The literature review revealed that a number of parametric families of distributions have been used to model CV data, such as the (log-) normal, (log-) logistic, exponential, Weibull, gamma and beta. In each family undertakes different assumptions about how the random variable z is distributed. The choice on the probability distribution relies on the type, behaviour and elicitation mode. Since the WTP distribution in this study was skewed and non-negative a revised lognormal distribution was employed to model the WTP data and approximate the empirical WTP distribution. By definition, lognormal distribution is only defined over positive numbers and results in probabilities defined by:

$$F(z; \mu, \sigma^2) = \Phi_{\text{nor}} \left[\frac{ln(z) - \mu}{\sigma} \right], \qquad z > 0 \tag{6}$$

and

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$$f(z; \mu, \sigma^2) = \frac{\mathrm{d}F(z; \mu, \sigma^2)}{\mathrm{d}z} = \left(\frac{1}{z\sigma}\right) \phi_{\mathrm{nor}} \left[\frac{ln(z) - \mu}{\sigma}\right], \qquad z > 0; \tag{7}$$

where $\Phi(\cdot)$ in equation (6) is the CDF of the standard normal distribution and $\phi(\cdot)$ in equation (7) is the PDF of the standard normal distribution[61].

However, the lognormal distribution is strictly positive, hence does not allow for the inclusion of zero WTP probability if left unaccounted for would lead to over-estimation of mean and median WTP. Hence, the model had to be tailored to correct for this issue and allow for the possibility of a zero WTP response. This was achieved by opting for a mixture model with a two-part specification to describe the WTP distribution; the spike model and the WTP positive model. The first part was used to explain whether respondents were generally WTP anything for victimisation risk reduction (the spike model) and the other to explain how much those who were WTP something are prepared to pay (the WTP model).

$$Part\ I\!: Prob(WTP > 0)$$
$$Part\ II\!: Prob(WTP|WTP > 0) \tag{8}$$

The first part aims at estimating the probability of a response being positive as opposed to zero, which in turn provides the probability of a response being zero as

$$Prob(WTP = 0) \equiv Prob[(WTP > 0)^C] = 1 - Prob(WTP > 0)^{62}.$$

This amounts to incorporating a new element to the distribution, a spike, which falls to the value of zero. The height of the spike represents the probability of having zero WTP. In mathematical notation the spike distribution is integrated in the model by adding a parameter, ϱ, which denotes the probability of zero WTP. According to Bateman et al. (2002), the functions describing the lognormal distribution after the correction of the spike parameter write as:

$$(\text{CDF}) \ F(z; \mu, \sigma^2, \varrho) = \begin{cases} \varrho & \text{if } WTP = 0 \\ \varrho + (1 - \varrho)\Phi\left(\frac{lnz - \mu}{\sigma}\right) & \text{if } WTP > 0 \end{cases} \tag{9}$$

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[61] The case where $\mu = 0$ and $\sigma^2 = 1$ is called the standard lognormal distribution and $\Phi_{nor}(z) = \int_{-\infty}^{z} \phi_{nor}(\omega)\, d\omega$; $\phi_{nor}(z) = \left(1/\sqrt{2\pi}\right)e^{-z^2/2}$.
[62] Consider a random variable x. By definition of a valid distribution function, Pr(x≤a)+Pr(x>a)=1↔ Pr(x≤a)=1-Pr(x>a).

and

$$\text{(PDF)} \quad f(z; \mu, \sigma^2, \varrho) = \begin{cases} \varrho & \text{if } WTP = 0 \\ (1 - \varrho)\Phi\left(\dfrac{lnz - \mu}{\sigma}\right) & \text{if } WTP > 0 \end{cases} . \tag{10}$$

Equations (9) and (10) generalise the probability distribution so that it successfully reflects the distribution of WTP data in this study. The interaction of two distributions implies a mixture model which admits positive probabilities to both zero and positive WTP. The two parts of the specification (eq. 8) provide basis for defining the econometric model that will be used to estimate the parametric values of mean and median WTP in the sample.

The full theoretical model assumes that the individuals' WTP is the dependent variable which operates as a function of a set of variables that conform not only to prior expectations stated by the existing literature (e.g. age, low education, FoC) but also to the economic theory (e.g. ability to pay denoted by income). Considering that there will be some variability in the valuations not captured by the selected variables and using the constant term ε to denote this, the theoretical model writes:

$$f(WTP) = \begin{pmatrix} sex & age & low\ education \\ previous\ victimisation & fear\ of\ crime & poor\ health \\ income & difficulty\ in\ answering & alcohol\ misuse \end{pmatrix} + \varepsilon. \tag{11}$$

To obtain the parametric mean and median WTP values, the theoretical model (11) must be constructed to abide to the econometric properties of a bid function model.

According to Bateman et al. (2002, p. 189) the simplest specification of the bid function can be described as

$$C = \alpha + \varepsilon \ and \ 0 \leq C \leq y \tag{12}$$

where C denotes the expected WTP (bounded by zero and ability to pay, y) defined by the observable properties from the sample population (denoted as α) and a random variable (ε), used to capture the unobservable variability in respondents' valuation. The value taken by this

random element cannot be predicted, but instead the likelihood of it taking any particular value can be estimated.

Parameter *a* can be further parameterised to account for factors assumed to influence respondents' valuations. This study used a linear form to specify the effects of those variables as shown below:

$$\alpha = \alpha_0 + a_1 X_1 + a_2 X_2 + \cdots + a_k X_k \,. \tag{13}$$

In this linear specification, $X_1, X_2 \ldots X_k$ denote the values taken by the factors that are assumed to influence the WTP (as seen on the left hand side of eq. 11) and coefficients $\alpha_0, a_1 \ldots a_k$ measure the marginal impact of each of the factors on the change in WTP.

For example, for the bid-function models in this study it is assumed that individuals with higher income will express higher WTP. That is, those with higher income have a higher probability of responding with large values of WTP than those on lower incomes. If the data follow this expectation, then the estimated parameter on income will be positive and the probability distribution of WTP will shift up to higher values for those with high income and down to lower values for those with low incomes.

To put the deterministic model presented in equation (12) in a probabilistic form, the left-hand side of equation (12) is replaced by the random variable *z*, (previously used to denote WTP) and using the aforementioned distributional assumptions (see equations 9, 10) this can be interpreted as:

$$z = C = \alpha + \varepsilon \xRightarrow{(9)(10)} Prob(WTP = C|\mu, \sigma^2, \varrho) = f(z; \mu, \sigma^2, \varrho) \; and \; 0 \le C \le y \tag{14}$$

Equation (14) concludes the definition of the probabilistic model. The defined model estimates the probability of observing any WTP value of C given the parameters of the model and of the distribution function (μ, σ^2, ϱ). Once these parameters are estimated and used with equation (14) the model will provide the probability of observing a certain value for z. Hence, the next objective is to estimate their values in a way that optimises the model's predictions on WTP; i.e. for the obtained probabilities of observing WTP values to best reflect their actual

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frequency in the sample. Once the parameters of the model are estimated, mean and median WTP can be calculated.

Considering the above, the estimation of parametric mean and median WTP values requires the estimation of the parameters of the model, which maximise the total likelihood of observing the reported WTP values. The most popular methods of parameter estimation are the Least-Squares Estimation (LSE) and the Maximum Likelihood Estimation (MLE). The literature suggests that MLE techniques comprise the most versatile method for constructing the estimators that best fit the data (Fisher 1925; Kempthorne & Folks 1971; Le Cam 1990; Meeker & Escobar 1994). On the comparison of LSE and MLE, Myung (2003, p. 90) attributes the appeal of MLE to a number of optimal properties that LSE lacks, such as

"*the sufficiency (complete information about the parameter of interest contained in its MLE estimator); consistency (true parameter value that generated the data recovered asymptotically, i.e. for data of sufficiently large samples); efficiency (lowest-possible variance of parameter estimates achieved asymptotically); and parameterisation invariance (same MLE solution obtained independent of the parameterisation used)*".

In general, MLE is a more easily applied technique as it allows the use of distributions other than Gaussian, as well as more general assumptions about the model and the form of the data (e.g. continuous, discrete, categorical, censored, truncated etc.) (Cook et al. 2003). Considering this, this study opted for the MLE techniques to establish the set of parameters that best fit the data and maximise the total likelihood of observing reported values.

In typical applications, the aim of applying MLE techniques is to find the probability p of obtaining the values of interest observed in the sample (here WTP) based on the independent variables incorporated in the model. Recall that a probability distribution is a mapping from a random variable, z, to the probability of having observed that random variable, $P(z)$, and that the probability p is denoted as a function of the distributional parameters denoted as θ (here θ refers to the location and scale parameters μ and σ^2 respectively). Fundamentally, the issue that the MLE technique tackles is to calculate the probability of observing the individuals' WTP as a function of the distributional parameters θ. The WTP observations in this study are obtained from N respondents indexed $i = 1$ to N. Assuming that is each respondent has equal probability of being included in the sample, then for OE data the probability of observing each

of the WTP values reported in the sample is the PDF of the probability distribution evaluated at that WTP (Bateman et al. 2002, p. 217). In mathematical notation, this translates as

$$l_i = Pr(z_i = C_i) = f(z_i; \theta) = \frac{1}{z_i \sqrt{2\pi\sigma^2}} exp\left\{-\frac{1}{2\sigma^2}[ln(z_i) - \mu]^2\right\} \quad i = 1 \text{ to } N, \tag{15}$$

for a specified z, where l_i denotes the estimated probability for each respondent, known as the individuals' Likelihood Contribution. The process of MLE application is described in three steps. The first step defines the Likelihood Function which is specified by the product of the total of the likelihood contributions in the sample as shown below:

$$L = \prod_i l_i = \prod_{i=1}^{N} f(z_i; \theta) = f(z_1; \theta) \cdot f(z_2; \theta) \cdots f(z_N; \theta) \tag{16}$$

where L measures the total probability as predicted by the model at the given parameters, that respondents will have provided the WTP responses recorded in the CV survey. Considering the above, the objective is to maximise the Likelihood Function of equation (16). Typically, maximisation operations employ logarithms for convenience purposes given that the logarithmic transformation entails certain properties that ease the algebraic calculations for obtaining the maximised function. Applying the (natural) logarithm over the equation (15) gives

$$lnL = ln\left(\prod_i l_i\right) = ln\left(\prod_{i=1}^{N} f(z_i; \theta)\right) = ln[f(z_1; \theta)] + ln[f(z_2; \theta)] \cdots + ln[f(z_N; \theta)]$$

$$= \sum_{i=1}^{N} ln[f(z_i; \theta)] = -\sum_{i=1}^{N} ln(z_i \sqrt{2\pi}) - nln(\sigma) - \frac{1}{2\sigma^2} \sum_{i=1}^{N} [ln(z_i) - \mu]^2 \tag{17}$$

Equation (17) describes the process of obtaining the Log Likelihood Function, where the logarithmisation turned the products of equation (16) into a sum. This eases the next step, which entails taking the derivative of equation (17) with respect to θ. In this case, where the selected distribution is described by two parameters $\theta = (\mu, \sigma^2)$ the likelihood $L(\mu, \sigma^2)$ is maximised over both parameters as shown below:

$$\frac{\partial}{\partial \mu} lnL(\mu, \sigma^2) = -\frac{1}{\sigma^2} \sum_{i=1}^{N} [ln(z_i) - \mu] \tag{18}$$

$$\frac{\partial}{\partial \sigma} lnL(\mu, \sigma^2) = -\frac{n}{\sigma} + \frac{1}{\sigma^3} \sum_{i=1}^{N} [ln(z_i) - \mu]^2 \tag{19}$$

Given that the logarithmic is a completely monotonic functions and strictly positive definite function over the range of the likelihood, the values that maximize the likelihood will also maximize its logarithm. Consequently, the third and final step of the maximisation entails setting the derived derivatives (equations 18 and 19) equal to zero and solving the system of partial derivatives $\partial L/\partial \mu$ and $\partial L/\partial \sigma$ for the distribution parameters (μ, σ^2). In mathematical notation this writes as

$$\frac{\partial}{\partial \mu} lnL(\mu, \sigma^2) = 0 \Longrightarrow -\frac{1}{\sigma^2} \sum_{i=1}^{N} [ln(z_i) - \mu] = 0$$

$$\frac{\partial}{\partial \sigma} lnL(\mu, \sigma^2) = 0 \Longrightarrow -\frac{n}{\sigma} + \frac{1}{\sigma^3} \sum_{i=1}^{N} [ln(z_i) - \mu]^2 = 0 \tag{20}$$

The solution yields the maximum likelihood estimates as follows:

$$\hat{\mu} = \frac{1}{n} \sum_{i=1}^{N} ln(z_i)$$

$$\hat{\sigma}^2 = \frac{1}{n} \sum_{i=1}^{N} [ln(z_i) - \hat{\mu}]^2 \tag{21}$$

The second-order conditions for a maximum are met and these values maximize equation (16). The optimal values of μ and σ^2 are then used to calculate the mean and median WTP values as (Cameron & Huppert 1989; Hanemann & Kanninen 1999; Bateman et al. 2002):

$$Mean\ WTP = exp\left(\mu + \frac{1}{2}\sigma^2\right) \tag{22}$$

$$Median\ WTP\ = exp(\mu)\ .$$

Given that this study treats zero valuations as valid and that the lognormal distribution is only defined only for positive values, the above equations should be corrected to allow the estimation to capture the zero values. Following Bateman et al. (2002, p. 245), this is achieved by multiplying the mean and median calculated for responses with positive WTP (described in (22)) by the probability that a response will have a positive WTP. Thus, using the previous notation of ϱ as the probability of having zero WTP (the spike parameter), the correction for the lognormal model gives:

$$(Mean\ WTP) \quad \bar{C} = (1 - \rho)[exp(\mu) \times exp(\sigma^2/2)]$$

$$(Median\ WTP) \quad \tilde{C} = (1 - \rho)\ exp(\mu).$$

(23)

In our case where we also need to investigate how the characteristics of a respondent impact upon the probability of a respondent being in the group with a WTP of zero; the parameter ϱ can be parameterised as follows:

$$\varrho = \frac{e^u}{e^u + 1}\ ,$$

(24)

where u denotes the regular linear regression equation that coincides with the expression used to describe the parameterisation of α (eq. 13). Bateman et al. (2002, p. 222) suggested the use of vectors for defining ϱ according to which *u* is described by vectors X and γ where X is a vector of variables used to parameterise *a* (factors that are assumed to influence the WTP as seen on the left hand side of eq. 11; also see eq. 13) and γ is a vector of parameters that measure the impact of the X variables on the probability of having zero WTP. Given the above, ϱ is a logistic function whose functional form outcomes form a continuum between 0 and 1 as expected for any quantity expressing probability.

6.4.2.3 Calculation of confidence intervals for mean and median WTP

The estimated mean and median values of WTP, as they derive from both econometric approaches (non-parametric and parametric), provide a measure of the central that only refer to the present dataset as all information for their calculation was provided by the CV survey without using any other means to approximate the characteristics of the general population. Assuming that the same CV instrument was tested with a different (second) sample, the new estimates would differ considerably in relation to those obtained from the first sample, as the respondent in the second sample would provide different valuations. The 95% Confidence Intervals (CIs thereafter) provide an indication of the accuracy of the obtained estimates. Generally, there are two routes available for constructing CIs; one is to follow the statistical theory and the techniques of statistical inference according to which straightforward formulae are employed to devise the 95% CIs. However, this analytical approach mostly applies to simple models that only roughly concord with this type of data. For this reason, the alternative of numerical techniques constitutes the most popular choice in the CV literature despite they are more computationally demanding.

Literature suggests three approaches to estimating CIs for willingness to pay measures; the delta (Cameron 1991) typically met in the Discrete Choice Experiment (DCE) literature, the Krinsky-Robb (Krinsky & Robb 1986; 1990) which is only applied to the estimates from the parametric estimation and bootstrapping (Efron 1979; Efron & Tibshirani 1993; Mooney & Duval 1993) which can be applied for any estimates regardless of their estimation mode. The delta method is mostly applied for dichotomous choice contingent valuation data and hence was not applicable to the context of this research.

The Krinsky-Robb procedure bases CI estimation upon the asymptotic properties of the maximum likelihood parameter estimates (e.g. $\hat{\alpha}, \hat{\sigma}^2$) of the best fitting model. Econometric theory indicates that under certain a set of assumptions (Haab & McConnell 2002, p. 111) these parameter estimates will be asymptotically normally distributed (as a multivariate normal distribution). The procedure is outlined in a few steps; first, the model of interest is estimated to obtain the parameter estimates of the distribution, which in turn gives the variances and covariance of this distribution by the variance-covariance matrix of the parameters. Next, a

random number generator is used to make repeated draws (≥ 1000) from the asymptotic distribution of the parameter estimates to construct a Monte Carlo simulated distribution of the estimate of WTP. Each individual draw provides a new WTP function and results in a new simulated value for the function. The resulting draws are ranked in ascending order and the empirical statistics are calculated from the sorted values for the WTP function where the 95% CIs defined as the values falling on the $2\frac{1}{2}$th and $97\frac{1}{2}$th percentiles (Bateman et al. 2002, p. 246; Haab & McConnell 2002, pp. 110-3).

The drawback of the Krinsky-Robb method is that it assumes that the parameter estimates follow a multivariate normal distribution, which cannot be always justified especially in small samples like the one in this study. The alternative, bootstrapping, has been steadily gaining a widespread application in economics (Horowitz 2001) and health (Haukoos & Lewis 2005; Hajiaghayi, Condon & Hoos 2012). Simply put, bootstrapping estimates a model many times using simulated data and using the computed quantities makes inferences from the actual data. As with the Krinsky -Robb method, bootstrapping generates a simulated distribution for WTP, without though making any assumptions about the distribution of the coefficients in the model. The bootstrap, therefore, has the same advantage as the Krinsky-Robb method in that it does not rely on the assumption that WTP is symmetrically distributed, but unlike the Krinsky-Robb method, it does not require the parameter estimates to follow a multivariate normal distribution. Consequently, bootstrap will perform better than the Krinsky-Robb method as it allows estimation of the sample distribution of almost any statistic even when the sample size is relatively small (Varian 2005). The only drawback of bootstrapping relies on the fact that it is computationally burdensome as it requires the construction of multiple simulated datasets used to simulate the distribution of WTP. In more detail, this is achieved by sampling N times with replacement from the original set of observations. Each of these samples is used to derive a new set of parameters from which estimates of WTP can be derived. These estimates are then ranked in ascending order and 95% CIs are defined as the values falling on the $2\frac{1}{2}$th and $97\frac{1}{2}$th percentiles (Bateman et al. 2002).

Considering the arguments above, bootstrapping was preferred for this study for three main reasons. First, because it requires the least assumptions on the nature of the data, second

because it works independently of the applied technique and third because it was deemed more appropriate as the extensive computing was not regarded as a major obstacle weighting the advantages it offers against the traditional techniques.

6.4.2.4 Applying the econometric model

The econometric model (eq.11) in this study was estimated using the parametric techniques summarised above. As Bateman et al. (2002) highlight, the 'best fitting' model when covariates are included does not necessarily imply the same distributional assumptions used in the parametric evaluation of the mean and median WTP. The further interpretation of the econometric model requires the evaluation of the bid function during the analytical procedures.

Literature indicates that a large number of models can be used for assessing WTP determinants. These include the bivariate probit model (Cameron & Quiggin 1994), the random effects probit model (Alberini, Kanninen & Carson 1997), the interval data logit model, also known as the (standard) double bounded model, DBM (Hanemann, Loomis & Kanninen 1991; Abdullah & Mariel 2010; Abdullah & Jeanty 2011); Poisson (negative binomial & zero-inflated Poisson, see Mullahy 1986; Lambert 1992), zero-inflated negative binomial (Lambert 1992; Greene 2002), Hurdle or two-part model (Mullahy 1986), Tobit (Yoo, Kim & Lee 2001), mixed logit (Sillano & de Ortúzar 2005; Hess, Bierlaire & Polak 2005; Hole & Kolstad 2012), multivariate logit (Lee 1983; Haas-Wilson & Savoca 1990; Fiebig et al. 2010). The appropriateness of the model lies on the mode of elicitation, as different assumptions are used in each modelling exercise.

The appropriate technique for econometric analysis of OE WTP data is an issue that has not yet been extensively addressed in SP studies. The review of the literature indicated that the type of elicitation adopted in the study directs the mode of econometric analysis. This research, where the OE approach was adopted, contained a fair proportion of zeros, which was decided not to be excluded in the econometric analysis. The literature suggests that a two-part specification performs better than OLS or a standard Tobit model (Donaldson et al. 1998). In the context of this study, WTP is described using a mixture model with a spike and truncated lognormal WTP distribution that accounted for the inclusion of zero valuations and the theoretical restrictions that WTP must be non-negative and less than income. The mixture model incorporates the

possibility that a respondent's willingness to pay would actually be zero and can be viewed as a generalisation of both the conventional model and the spike model (An & Ayala 1996). This translates to a two-part specification which describes the WTP distribution, as previously described in eq. (8). The first part was used to explain whether respondents were generally willing to pay anything for victimisation risk reduction (the spike model) and the other to explain how much those who were WTP something are prepared to pay (the WTP model). These two models were combined to provide the full model (see eq. 11), which was used to estimate the parametric values of mean and median WTP in the sample.

6.4.2.5 Interpreting the econometric model

Aside from evaluating the WTP component, this study also aimed at investigating the impact on WTP of changes in the scenarios presented in the survey. The bid function was used (1) to assess how the socioeconomic and experience variables explain the individuals' willingness to pay, (2) to test that responses have a distinguishable structure and (3) to test that the responses conform to prior expectations and economic theory. Previous studies in the context of crime show significant (positive) relationships with WTP for income (Cameron & James 1987; Cameron 1998; Cook & Ludwig 2000; Ludwig & Cook 2001; Cohen et al. 2004; Atkinson, Healey & Mourato 2005), education (Atkinson, Healey & Mourato 2005), number of children in the household (Cook & Ludwig 2000; Ludwig & Cook 2001), race (Cook & Ludwig 2000; Ludwig & Cook 2001) and FoC (Atkinson, Healey & Mourato 2005).

The hypotheses used to model the data of this study were defined based on the evidence available in the context of crime and they were tested against an alternative of no effect, thus pertained to the signs of the estimated parameters as presented in Table 6:1.[63] Variables that were expected to increase WTP (e.g. income) would have positively signed coefficients and vice versa; i.e. negatively signed coefficients would be related to variables expected to decrease WTP, such as no FoC or lower education.

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[63] As previously argued, in the context of CV the actual values of the bid function parameters in the model are of minor importance. Instead, the importance lies on the sign (positive/negative) and the significance of the parameters given that they demonstrate (alongside the pseudoR^2) the overall explanatory power of the model (Bateman et al. 2002).

Table 6:1 Variables used as determinants of WTP in the econometric model

Variable	Description	Expected influence on WTP
Gender	=1 if male (*sex*: dummy)	No assumption
Age	Years (interval)	No assumption
Low education	=1 1 if education was described as none/CSE/O' levels/GCSE/AS level (*loweduc*: dummy)	-
Victim	=1 1 if victim of violent crime in the past	+
Income	Individual monthly (interval)	+
linco	Log (Income)	+
Fear of crime	=1 1 if worried about crime (*foc*: dummy)	+
Difficulty	=1 1 if found questionnaire difficult (*diff* dummy)	-
Poor health	=1 of overall health score lower than 60 (*poorh*: dummy)	No assumption
Alcohol misuse	=1 if alcohol units exceeded 6(women)/8(men) on a weekly/daily/almost daily basis (*misalc*: dummy)	No assumption

It was expected for findings to be consistent with the literature but not without variations since the characteristics of the sample do not remain constant across different studies. For instance, the present study was carried out using convenience sampling, with the 70% of the respondents being University students of white ethic background and single. This alone may be regarded as the cause of variations, as it does not allow, for example, the reliable assessment of the relationships of the variables denoting ethnicity, marital status or number of family dependents and WTP due to the small size representative of the available alternatives. Thus, a drawback in this estimation exercise was that the variables used to model the CV data were limited to the characteristics of the study's sample. If a variable with a small number of observations was used, that would directly impair the outcome, as the later analysis would only be applied to that number of observations. Hence, the selection of the variables used to model the data was done based on the three criteria: (1) the existing evidence in the related literature, (2) the number of observations within each candidate control variable, and (3) the value of the likelihood function at the maximised values of the parameters. As advised in Bateman et al. (2002), a number of models were estimated using different parametric assumptions and the final model was the one that returned the highest value for the likelihood function.

To assess the specification, two regression models were employed. First, logit regression was used to examine how the probability of agreeing to a certain payment varies over factors (the bid function parameters) such as age, previous victimisation experience, FoC etc. Coefficients from the logit regression then can be used to estimate how the decision of providing a zero WTP value varies with change in the number of these bid function parameters. Next, multiple regression was used to model the level of WTP from the respondents with positive WTP. Regression techniques are typically employed when the interest of the analysis is to assess the statistical dependence of one variable (the dependent variable; here the WTP range) on other (independent) variables. The analysis explains what proportion of variance between variables can be attributed to the dependent variable and what proportion to the independent variables. Multiple regression analysis constitutes one of the most widely used vehicles for empirical analysis in economics with the ordinary least squares technique being the most popular choice for estimating the parameters of the multiple regression models. Given that the WTP bids were elicited via OE questions, the responses constitute a continuous amount of WTP where ordinary least squares (OLS) can be successfully applied to model the positive WTP data. The most obvious difference between the two parts of the specification is that in OLS regression the dependent variable is continuous whereas in the logistic regression, it is binary and coded as 0 and 1. Because the dependent variable is binary, different assumptions are made in logistic regression than are made in OLS regression. To account for the assumption of normality, the logarithm transformations were applied as appropriate (WTP, income, age) as their transformations provided a better fit to the data than the variables themselves.

The probability to pay anything, logit of P(WTP>0), was estimated using logistic regression. Logistic regression models estimate probabilities of events as functions of independent variables. Let y represent a value on the dependent variable for case i, and the values of k independent variables for this same case be represented as x_{ij} (j=1,k). Suppose Y is a binary variable measuring the decision to pay anything for the scenario described in the questionnaire. Coding $y_i = 1$ if case i decides on providing a positive WTP amount and 0 otherwise, then p_i equals the probability that $y_i = 1$. The odds that $y_i = 1$ are given by $p_i / (1 - p_i)$. The logit (or log odds) of p_i equals the natural logarithm of $p_i / (1 - p_i)$. The STATA syntax defined the predictor for

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each model as a dichotomous variable (pos_WTP$_i$), coded as 1 if WTP was positive (P(WTP$_i$)=1 if WTP$_i$>0) and as 0 otherwise (P(WTP$_i$)=0 if WTP$_i$=0). Logistic regression estimates the probability of a person having any positive WTP as a linear combination of the independent variables as shown below.

$$Part\ I: logit\ [Prob(WTP > 0)]^* =$$
$$= f \begin{pmatrix} Age, Sex, Education, Victim, Income, \\ Fear\ of\ crime, Difficulty, Poor\ health, Alcohol\ misuse \end{pmatrix} \quad (26)$$

*Note: The predicted probability for case i is then given by p$_i$=exp(logit$_i$)/ [1+e xp(logit$_i$)].

It should be mentioned that both logit and probit models were tested and provided similar results. Logit models are presented here for ease of interpretation and because logit models are more popular for modelling the decision making procedures (such as that of stating positive WTP). This preference can be attributed to the fact that probit assumes a normal distribution, while logit assumes a logistic distribution of the dataset.

While the first part of the specification for WTP estimated the probability of any positive WTP using logistic regression the second part used multiple regression analysis to model the level of WTP from the respondents with positive WTP. Given that the WTP bids were elicited via OE questions, the responses constitute a continuous amount of WTP where ordinary least squares (OLS) can be successfully applied to model the positive WTP data. Equation (27) describes the second part of the specification used to obtain the determinants of the amount of WTP conditional on having a positive WTP.

$$Part\ II: Prob(WTP|WTP > 0) =$$
$$= f \begin{pmatrix} Age, Sex, Education, Victim, Income, \\ Fear\ of\ crime, Difficulty, Poor\ health, Alcohol\ misuse \end{pmatrix} \quad (27)$$

Both types of regression in this two-part specification are similar not only in terms of interpretation (both were applied to analyse factors affecting WTP responses) but also in procedures, in that they both (i) determine the statistically significant predictor variables, (ii) require diagnostics to check the validity of the assumptions, (iii) provide a test-statistic indicative

of the overall statistical significance of the model and (iv) calculate a coefficient and standard error for each of the control variables.

In addition, the parametric modelling of the bid function provides the means for assessing whether WTP estimates follow theoretical validity. In this context, theoretical validity refers to the extent to which a measure behaves according to theoretical predictions (Whitehead 1995; Whitehead et al. 1995). Testing the behaviour of coefficients in the regression model aids at establishing this validity as it can reveal potential associations between the WTP values and the experimental variables as obtained by the research, examine the existence of distinguishable patterns in the data as to whether for example coefficients retain the same behaviour across the models and verify whether these patterns conform to prior expectations (Bateman et al. 2002). The conclusions from this assessment can be used to claim the internal consistency of the CV responses as in essence the models provide the means for testing the structure of the obtained responses. A-priori assumptions refer to a number of variables that presumably influence the WTP of a respondent. In this research such variables will include the respondent's (i) attitudes towards the change in the CV scenario (e.g. scenario ranking, difficulty score), (ii) income and other socio-economic characteristics (e.g. age, sex), (iii) demographic and habitual characteristics (e.g. ethnicity, alcohol use, FoC), and (iv) experience characteristics (e.g. previous victimisation experience and details thereon).

The objective is thus to see how well these variables explain respondents' WTP and the approach is to interpret the bid function parameters. In the context of CV, the focus primarily lays on the sign and significance of the estimated parameters rather their actual values (Bateman et al. 2002, p. 195). This entails checking that the estimated parameters have signs that conform to prior expectation. A negative (positive) sign and significance of these covariates implies that individuals have decreased (increased) WTP for the specific risk reduction. Thus, variables that are expected to increase WTP (e.g. income) are expected to be positively signed whilst others which are expected to reduce WTP are expected to be negatively signed (e.g. no FoC). The statistical significance for each of these parameters is typically tested using of t-tests (with the null hypothesis being that the variable does not influence WTP) and results present both signs and their corresponding statistical significance.

However, the direction of the coefficients should not be interpreted as solitary units. Instead, the signs and statistical significance should be assessed coupled with the coefficients denoting the overall explanatory power of the model. As Pearce and Özdemiroglu (2002) explain, that is because these quantities are used to establish that the respondent's WTP values are not purely random; which constitutes one of the main objectives in the CV experiment. A number of measures are available for assessing the explanatory power of the model.

In logistic regression, the strength of associations is typically assessed by the pseudoR^2 statistic (Hosmer & Lemeshow 1989). The statistic is typically[64] bounded by zero and one, where a greater value suggests greater fit and hence claims greater explanatory power of the model (Pearce & Özdemiroglu 2002; Bateman et al. 2002, p. 196). Authors have suggested a variety of pseudoR^2 statistics to aid the interpretation of the logistic models to a mode similar to that in OLS (McFadden 1974; McKelvey & Zavoina 1975; Maddala 1983; Agresti 1986; Nagelkerke 1991; Cox & Wermuch 1992; Ash & Shwartz 1999; Zheng & Agresti 2000). However, the pseudoR^2 statistic is not equivalent to the R^2 of standard regression or as powerful. It was developed to aid econometric research in evaluating the fit of the explanatory models in a mode similar to that of the popular regression. This research adopted the McFadden (1974, p. 121) pseudoR^2 statistic, R^2_{MF}[65], as a measure of the strength of association, where values of 0.2-0.4 are considered highly satisfactory. The R^2_{MF} constitutes the most frequently cited statistic in logistic regression as it provides the logical analogue to percentage of explained variation given by R^2 in OLS. The lack of a certain threshold to denote a well-specified model highlights the caution that should be taken during the interpretation, especially in the context of contingent valuation where great variation is expected to unobserved characteristics.

The statistics reported for each model are briefly explained. The resulting Chi-squared denotes the likelihood ratio (LR) chi-square test and indicates that all models are statistically significant at the 5% level or better (with models B2, D2, F2 being an exception). Coupled with the pseudo R-squared, the higher set of values for both statistics, the better the indication is that the model fits the data (better predicts the outcome). It should be mentioned though, that the importance of

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[64] Some pseudo R^2 do not range from 0 to1 but are modified to this range to more closely match the scale of the OLS R-squared, see for example Cox & Snell's (1989) pseudo R^2 which was later modified by Nagelkerke (1991) to reach the value of one.
[65] The R^2_{MF} which corresponds to Theil's (1970) uncertainty coefficient

the pseudo R-squared statistic had been disputed (e.g. see Hosmer & Lemeshow 2000) as it is not the equivalent to the R-squared found in OLS regression, but an effort to approximate it[66]. The lack of evidence to support its efficacy in assessing the predictive strength of the logistic regression model suggests great caution in its interpretation (Hu, Shao & Palta 2006). The log likelihoods of the fitted models are the logarithms of the probability of observing the given set of observations, given the value of the parameters. The numbers are used in MLE calculations to aid comparisons to other models.

In examining the pseudo R^2 statistics, as previously mentioned these constitute a measure of proportional reduction of error so that the possible values are between 0 and 1, with larger values corresponding to stronger predictions. In general, the pseudo R^2 measures the improvement in prediction of the dependent variable that results from the use of the linear logistic model in which the listed predicting variables have been used[67] (Haberman 1982). Not without debate, the statistic can be regarded to work similar to that of the R^2 in regression; denoting a measure of association rather than goodness of fit (Nettles & Millett 2006). For example, it is possible for a logistic model to fit perfectly but the pseudo R^2 to be small and vice versa (Gilula & Haberman 2001). Notably, the cited references provide a number of examples from the literature where the pseudo R^2 statistic is less than 0.2, if the statistic is reported.

For the OLS regression, this study reported the coefficients of determination R^2 and adjusted R^2 (for balancing parsimony), MSE and F statistics to provide a picture of the overall explanatory power of the model. An explanation of the employed measures can be found in the results section; briefly the R^2 is interpreted as the proportion of the sample variation in the dependent variable (in this case the WTP amount) that is explained by the OLS regression line, the MSE reflects the model's accuracy in estimating the observed probability and the F statistic uses the MSE value to test whether the estimated model is statistically significant. In terms of actual values, the higher R^2 the better the fit of the model and a large F statistic coupled with a small p-value (or F-significance) implies that the model is statistically significant. Additionally, to

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[66] So that it can be interpreted as an approximate variance in the outcome accounted for by the predictors.
[67] The measure of predictive accuracy is the logarithmic penalty function so that if the logistic model is correct then the pseudo R^2 compares the unconditional entropy of the dependent variable with the conditional entropy of the dependent variable given the predicted probabilities (Nettles & Millett 2006, pp. 137-8).

examine for multicollinearity, which, if apparent may weaken the explanatory power of a regression model, all explanatory variables were tested for correlation.

The statistics reported for each model were: the number of observations used in each model (N), the R^2 indicative of the proportion of variance in the outcome which can be explained by the independent variables, the Adjusted R^2 which is an adjustment of the R^2 that penalises the addition of extraneous predictors to the model, the square root of the Mean Square Error (Root MSE) denoting the standard deviation of the error term and the p-value associated with the computed F-statistic (Prob > F) . A brief interpretation of these statistics follows.

As previously discussed, the R^2 is a measure of the proportion of the total variation attributed to the fit of the model, reflecting the extent to which the combination of independent variables is associated with the dependent one without accounting for individual associations. The adjusted R^2 is a modified version of R^2 adjusted to account for the degrees of freedom (i.e. the number of explanatory terms) incorporated in the model and is computed using the formula $1 - ((1 - R^2)((N - 1) / (N - k - 1))$ where k is the number of control variables. Unlike R^2, the adjusted R^2 increases only if a newly added term improves the model more than would be expected by chance, but by definition its values are always less than or equal to R^2. In terms of actual values, the higher the better the fit of the model. The MSE is a measure of a model's accuracy in estimating the observed probability of an event, and low values indicate accurate estimation. The F-statistic is used in testing the null hypothesis that the control variables shows no relationship to the dependent variables; i.e. that all of the model coefficients are 0. Large F-statistics with significant p-values indicate good fit showing that the set of predictors are related to the outcome in the sample population (Tabachnick & Fidell 1996). The Akaike Information Criterion measure, AIC (Akaike 1974), and its Bayesian alternative, Bayesian Information Criterion, BIC (Schwarz 1978; Akaike 1978), were also computed but not reported here as they were used in the model selection and cannot be interpreted as single fit measures. Moreover, comparisons of the AIC statistic across models require the same number of observations to be present in each model. It should be noted though, that the accuracy of both AIC and BIC at selecting the best overall model consistently declined as the total number of predictors was increased.

6.5 Results

This section reports on the results of the contingent valuation survey. The findings are reported in two parts: the first part reports on the summary statistics from the section on attitudes, uses and socio-economic characteristics and the second on the full econometric analysis of the valuation results.

6.5.1 Sample characteristics

This section presents a summary of all the variables that were used in the survey to describe the sample. Results are discussed in two subsections and present where applicable a disaggregation according to readily identifiable groups of interest (e.g. victims and non-victims, alcohol users and non-). All characteristics of the sample in the study, later used as explanatory variables, are accumulated in Tables 6:2 and 6:3.

6.5.1.1 Socio-economic characteristics

In all, 385 responses were collected over the 5-month period of the survey. Table 6:2 presents a summary of the sample characteristics that pertain to the socio-economic and demographic descriptors. Table 6:1 shows that 62.6% of respondents were female and that the average respondent was 27 years old, single, of white ethnic origin. The age ranged from 19 to 76 years with the median being 23 and the average monthly net income was £903.46 as calculated from 376 responses (income non-response rate: 2.33%). The income responses were grouped according to the percentile they belonged in the following four groups: (1) up to 25th percentile (£300 p.m.) with 104 (35.14%) responses; (2) up to 75th percentile (£301 to £1, 025 p.m.) with 122 (41.22%) responses; (3) up to 95th percentile (from £1, 026 to £2,400 p.m.) with 52 (17.57%) responses, and (4) up to max (£2,401 p.m. or more) with 18 (6.08%) responses. The variable denoting income was best described by lognormal distribution with the median being equal to the mode (500) and preceding the mean by 403.46 units. The reported individuals' income implies an annual income rate of £10,841.51 (SD=18,739.49). The high standard deviation is attributed to the variation observed in the occupational status of the sample, as the majority of the respondents were students in full time education (72.21%).

With respect to education attainment, the most frequently opted qualification was that of Apprenticeship or A/AS level by 48.83% followed by University Degree or Diploma by 42.60%. The correlation between income and educational attainment confidence was significant and positive, Spearman's rho =0.45, p<0.01 (H_0: the quantities are independent), suggestive of higher income being reported from respondents with higher educational qualifications. Regarding general health characteristics, the average response in the question "*How happy would you say you are?*" was 7.13 (SD= 1.88; on 1-10 scale). This metric compares well to the average score of 82.1 derived from the EQ-5D-5L health outcome measure (see Table 6:2).

Table 6:2 Summary of sample demographic and socio-economic characteristics

	Sample
Total number of individuals	385
Males	144 (37.4%)
Age	27.15 (SD= 11.4)
Ethnicity	
White	339 (88.05%)
Mixed	10 (2.6%)
Asian or Asian British	18 (4.68%)
Chinese	11 (2.86%)
Any other ethnic group	7 (1.82%)
Marital status	
Married	43 (11.17%)
Divorced/Separated	11 (2.86%)
Widowed	3 (0.78%)
Single	283 (73.51%)
Other	45 (11.69%)
Education	
None	5 (1.30%)
CSE/O' levels or GCSE	9 (2.34%)
Apprenticeship or A/AS level	188 (48.83%)
University Degree or Diploma	164 (42.60%)
Other	19 (4.94%)
Occupational status	
Working	84 (21.82%)
Unemployed	7 (1.82%)
Looking after home/family	1 (0.26%)
Retired	14 (3.64%)
Student	278 (72.21%)
Other	1 (0.26%)
Average monthly income	£903.46 (SD=1,561.62)
Happiness score	7.13 (SD= 1.88)

EQ-5D-5L		
VAS	82.1	(SD= 37.05)
Mobility	1.1	(SD= .39| max:4)
Self-care	1.04	(SD=.23 | max:3)
Usual activities	1.14	(SD=.45 | max:4)
Pain/discomfort	1.37	(SD=.64 | max:4)
Anxiety/depression	1.65	(SD=.82 | max:5)

6.5.1.2 Uses and attitudes

A summary of the variables that pertained to experience characteristics (attitudinal, behavioural and lifestyle questions) is presented in Table 6:3. The victimisation module was broken down into three segments (indentified through increase intent levels in Table 6:3) depending on a respondent's previous responses. Only those that affirmed previous direct experience with victimisation were eligible to proceed on the assault-related questions (the section was automatically skipped in any other case). Five respondents (1.3%) refused to answer the victimisation module.

To assess repeat victimisation, respondents from the victims' segment of the sample (n_{tot}=106) were asked on the number of times they were victimised. The results demonstrated that the victimisation incident had happened once for the 43.4% (46), twice for the 24.53% (26) and three times or more for the 31.13% (33) of the respective responses, whereas one person refused to answer. In terms of the most recent incident, three 6-month intervals were provided and 19.81% (21) of the respondents replied with the 0-6 month option, 12.26% (13) with the 7-12 month option and 66.04% (70) with the 12 or more month option. Two respondents (1.89%) replied with the "*Do not know*" option. These data specified that 32.08% of the sample was victimised in the 12 months prior to the survey (respondents were prompted to respond the remaining questions of the victimisation section keeping in mind the most recent incident). Approximately 45% of the sample in the victimisation module confirmed being intoxicated during the violent incident, where three respondents opted for the "*Do not know*" option (2.83%) and two refused to disclose this information (1.89%). Approximately 60% (63 responses: 59.43%) of the victims in the sample reportedly sustained physical injuries during the most recent incident and a further 39.68% of those (25 responses) required medical treatment for

their injuries. Superficial injuries were the most prevalent type of physical injury; in head by 76.19% followed by limbs by 7.94% (see Table 6:3). In agreement with expectations and previous findings (see Chapter 4), the head was the most susceptible part of the body for assault related injury as it was the only part of the body where both types of injury were recorded (superficial and significant). In addition, an OE question asked victims to supplement their answer in case where their injury was not covered by the available options. Five responses were recorded: "*Bruising and scratching on my back and buttocks and internally (sexual assault)*", "*Worried about affect of a kick to the head but never got it checked as a trip to A&E is worse than minor brain damage*", "*I had a deep knife cut across my finger*", "*He knocked out 2 of my teeth*" and "*Spinal injuries*".

From the total sample, 82.86% consumed alcohol. The "Modified Single Alcohol Screening Question" (M-SASQ) was used as a screening tool for describing the alcohol consumption in the sample. The frequency of consuming 6 or more units if female, or 8 or more if male, on a single occasion was less than monthly for the 33.23% (106) of the sample, followed by monthly by 25.08%, weekly by 22.26% and daily/almost daily by 0.94%. Fifty-nine (18.5%) respondents indicated that they never consume such a quantity per single occasion. The total scoring was calculated as follows: on a 0="Never", 1=" Less than monthly" to 4="Daily/Almost daily" scale, a total of 0 – 1 indicates lower risk drinkers and a total of 2 – 4 indicates increasing or higher risk drinkers. The overall scoring of the sample revealed that on average respondents were among the second category (mean value of 2.54, SD= 1.06) with the variable presenting positive skewness (right-tailed) above 2, hence eligible for further dependence screening.

In terms of leisure expenditures, the reported mean value of spending per week was £35.53 (SD= 9.21) which was multiplied by four to estimate an approximate leisure spending per month (see Table 6:3). Correlation was used to assess the relationship between the variables denoting monthly leisure expenditures and monthly income. Spearman coefficient confirmed a positive and statistically significant (though low) correlation between the two variables (Spearman's rho= 0.1773; Ho: *monspe* and *income* are independent p-value= .0006). Similarly, the average spending on alcohol per occasion was calculated based on stated average quantity of the alcohol beverages consumed per occasion (4.89, SD= 3.45) multiplied by the stated value of that drink (£2.79,

SD=1.2)[68]. The most important feature for victims' compensation (Q10[69]) was reportedly both psychological and physical injuries by 72.73% (280; see Table 6:3). A brief thematic analysis on the comments identified three major core categories (main schemes) that pertained to the aftermath of the incident; that is (1) the tangible economic losses (e.g. lost earnings, therapy costs), (2) the intangible losses in quality of life (e.g. vulnerability, impact on close environment), and (3) provision of lifelong moral rather than financial support.

Table 6:3 Summary of sample experience characteristics (uses and attitudes)

	Sample (n_{tot}=385)	
Threatened with violence	190	(49.35%)
Victims of violent crime	106	(27.53%)
Repeat Victimisation (3 times or more)	33	(31.13%)
In the previous 12 months	34	(32.08%)
In the previous five years	70	(66.04%)
Under the influence of alcohol	46	(43.40%)
Physically Injured	63	(59.43%)
Medical treatment required	25	(39.68%)
Type of sustained injury		
Head: Superficial injuries	48	(76.19%)
Head: Significant injuries	4	(6.35%)
Torso: Superficial injuries	4	(6.35%)
Limbs: Superficial injuries	5	(7.94%)
Limbs: Other significant injuries	2	(3.17%)
Seriousness of incident		
Very serious	13	(20.63%)
Fairly serious	19	(30.16%)
Not very serious	30	(47.62%)
Acquaintances victims	210	(54.55%)
Policing as the most effective way to reduce violent crime	182	(47.27%)
Worried about crime		
Never	50	(12.99%)
Just occasionally	202	(52.47%)
Some of the time	117	(30.39%)
All/most of the time	16	(4.16%)
Most important feature for victims' compensation		
The upset and inconvenience they suffer	35	(9.09%)
The physical injuries they suffer	34	(8.83%)
Both the above	280	(72.73%)
None of the above	4	(1.04%)

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[68] *"How much do you pay for one of your usual alcoholic drinks?"*
"How many of your usual alcoholic drinks do you typically have in total on a single occasion?"
[69] *"What do you think is the most important feature to be used when working out how much someone should be compensated?"*

Do not know/Do not wish to answer	3	(0.78%)
Other	29	(7.53%)
Average leisure spending per month	£142.13	(SD= 175.34)
Alcohol consumers	319	(82.86%)
Average spending on alcohol per occasion	£13.08	(SD= 9.21)
Consume 8/6 or more drinks per occasion		
Never	59	(18.50 %)
Less than monthly	106	(33.23%)
Monthly	80	(25.08%)
Weekly	71	(22.26%)
Daily/Almost daily	3	(0.94%)

The second part of the valuation module contained a number of screening questions, used as screening tools to identify potential protest responses against the implementation of the prevention programme that derived from the lack of trust in police efficiency. The responses revealed that 42.27% (182) of the total sample was affirmative in that policing is the most effective measure against violent crime and 19.22% (74) opted for the *'Do not know'* option. For the implementation of the prevention programme to reduce violent crime by 10% and 50% was voted by 310 (80.52%) and 368 (95.58%) respondents respectively[70]. Cross-tabulations between responses to the programme vote and police efficiency indicated that 13 respondents that were against the implementation of the programme for 10% reduction in violent crime were also negative on the efficiency of police, while 98 respondents negative on the efficiency of policing voted *'for'* the implementation of the prevention programme. Similarly, 4 respondents that were against the implementation of the programme for 50% reduction in violent crime were also negative on the efficiency of police, while 120 respondents negative on the efficiency of policing voted *'for'* the implementation of the programme. Forty-five (11.69%) respondents confirmed that they would change their vote on the implementation of the programme if it offered compensation to victims that were assaulted. Cross-tabulations showed that four of those had voted *'against'* the implementation of the programme for the 10% reduction, 27 *'for'* and 14 *'Do not know'*. In the same way, one of those had voted *'against'* the implementation of the programme for the 50% reduction, 42 *'for'* and 2 *'Do not know'*.

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[70] "*Imagine that there is a partnership programme to reduce non-domestic & non-sexual violence. This programme has already been shown to work in an area very similar to yours and you have to vote on whether you would like the programme introduced in your area. How would you vote on the introduction of this programme if it prevented non-domestic & non-sexual violent assaults to your community (-by 10%, -by 50%)?*"

The valuation module concluded with the self-rating questions on the difficulty met while answering the specific section and the respondent's confidence in the stated valuations. Both variables were normally distributed[71] with the majority of the sample opting for the central point options from the Likert scales; i.e. "*Somewhat confident*" was selected by 151 (39.22%) respondents and "*Somewhat difficult*" by 133 (34.55%) respondents. Table 6:4 presents the cross-tabulation of these results.

Table 6:4 Self-ratings of difficulty in answering the valuation questions and confidence in the stated responses

Questions difficult to answer	Confidence in the responses					Total
	Not at all confident	*Slightly confident*	*Somewhat confident*	*Very confident*	*Extremely confident*	
Extremely difficult	8	7	6	3	2	26
Very difficult	10	24	24	7	0	65
Somewhat difficult	2	38	66	26	1	133
Slightly difficult	0	23	45	41	9	118
Not at all difficult	1	2	10	22	8	43
Total	21	94	151	99	20	385

Overall, the sample was quite confident in their stated responses (mean value of 3.01, SD= .96, on a 1="*Not at all confident*", 2 ="*Slightly confident*" to5="*Extremely confident*" scale) and found the CV questions were moderately difficult to answer (mean value of 2.77, SD=1.07, on a1="*Not at all difficult*", 2 ="*Slightly difficult*" to5="*Extremely difficult*" scale). Notably, confidence was negatively but not significantly correlated with WTP (Spearman's rho[72] = -0.03, p=0.55); that is respondents who were more confident in their valuations provided smaller WTP amounts. In addition, the correlation between confidence and difficulty was significant and negative (Spearman's rho= -0.427, p<0.01 where H_0: the quantities are independent), suggesting that respondents who found the questions hard to answer were less confident in their responses.

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[71] Shapiro-Wilk test for normality: p-value= 0.999 for confidence and 0.611 for difficulty, hence unable to reject the null hypothesis (the H_0 states that the variable is normally distributed) at the 5% level of significance-suggestive that the relationship is normal. Graphical methods confirmed this outcome.

[72] Spearman's correlation was preferred over Pearson's as the method makes no assumptions about the distribution of the data and is less sensitive to influential points/outliers compared to Pearson's; hence is more appropriate for data with large outliers from series that are not normally distributed (as with the WTP values).

6.5.2 Analysis of Contingent Valuation Data

This section presents the results of the econometric analysis of survey data in four subsections. The non-parametric approach to analyse respondents' WTP for changes in victimisation outcomes is presented first, followed by the parametric estimation, which entails the specification of the bid function, as described in the previous section. The third subsection presents the results from both approaches for the aid of comparison while also details the results on WTA and compensation addressed by the CV survey. The fourth subsection discusses the specification and the estimation of the bid function model, including the interpretation of the parameters and the explanatory power of the models. To show the spike at zero WTP, frequency plots of the WTP data have been provided previous to the survival curves of the non-parametric estimation in Appendix 3 (§3.4).

Before aggregating the valuation data individual level analysis was carried out to assess the responses that were recorded as 'protests' (outliers). All responses identified as outliers were examined separately and the profiles of the responses are summarised in the Appendix 3 (see Table in section 3.3). Results indicated that for the WTP data, the outliers for the different outcomes were always from the same 36 respondents but not consistently. That is, some provided an extreme value in some of the questions asked but not in all. Only 3 of these respondents provided consistently unusable responses in all CV questions.

To assess the agreement in the rank ordering of WTP across all respondents, the Friedman test was employed. The null hypothesis was that the distribution of the ranks of each type of score was the same. To perform the test, data was initially transposed (subjects to columns and values to rows). Results indicated that for all WTP values on preventing the Scenarios A-F from happening, the Friedman chi-square statistic was significant at the 1% level of significance (Friedman= 4.4e+03, Kendall= 0.639, $p<0.01$) suggesting that there is a difference in the obtained WTP values. Similar, the Friedman statistic was significant at the 1% level when testing for differences in the WTP values for funding the victimisation programme (Friedman= 251.571, Kendall= 0.659, $p<0.01$), the compensatory amounts (Friedman= 1.3e+03, Kendall= 0.684, $p<0.01$) and the ranking of the Scenarios (Friedman= 1.1e+03, Kendall= 0.586, $p<0.01$).

6.5.2.1 Non-parametric estimates of mean /median WTP

The Kaplan-Meier product limit estimator (Kaplan & Meier 1958) was employed to construct the survivor function for the WTP responses for the non-parametric estimation. The KM survivor curves for each of the eight scenarios[73] examined in this research are attached in Appendix 3 (§3.5) given that all survivor curves follow a similar pattern where the likelihood of an affirmative response falls as the value of the WTP rises. For illustration purposes, Figure 6:2 presents the KM curve traced out from the WTP amounts respondents were willing to pay to prevent the chance of any Scenario A-F from happening as a one-off payment.
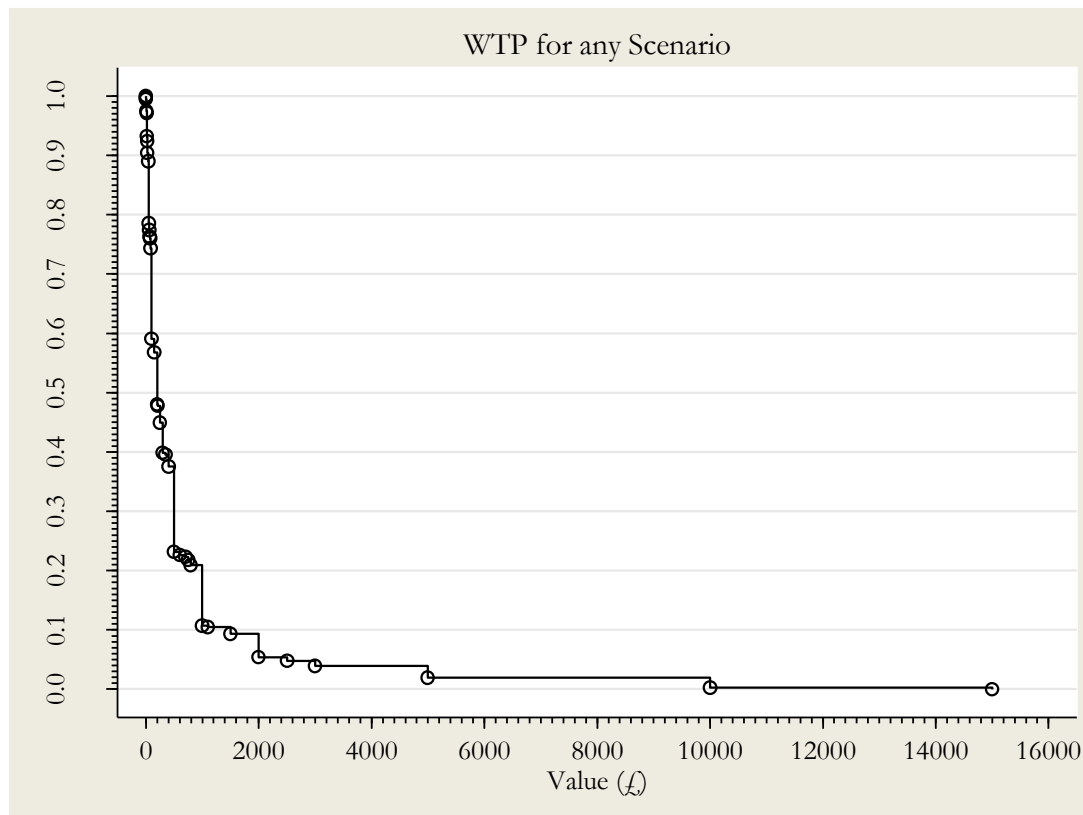

Figure 6:2 KM survivor function for WTP to prevent any Scenario from happening

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[73] These were WTP to prevent the chance of scenarios A-F from happening by 10%, 50% and 100% and WTP to fund a 10% and 50% decrease in non-sexual violent assaults through a prevention programme.

The KM curve presents an estimate of survival as a function of the observed WTP bids (in pounds: x-axis) and the percentage of the total number of responses that corresponds to these amounts (i.e. the probability of survival: y-axis). Survival probabilities for any given WTP value can be estimated by projecting up from the bid of interest on the x-axis until it hits the survival curve and then moving to the left to the y-axis estimate. Reversely, the estimated bid to event percentiles are obtained by starting at the y-axis point of interest (e.g. 0.5 for 50th percentile), projecting horizontally until the survival curve is met, and heading down to the x-axis time point to get the estimate. Estimates of the mean WTP values can also be derived from the KM survivor function as the area under the survivor curve. The annual income that was used was an upper bound for WTP among sampled respondents was calculated as £15,000. This result allowed bounding the survivor curve on the x-axis and facilitated calculation of the mean WTP (also see Appendix 3, §3.6). Inspection of the graphs shows that the area under the tail end of the distribution is larger for the Scenarios describing more severe outcomes (Scenarios B, D and F) and higher risk reductions (50% and 100%) compared to those describing less severe outcomes (Scenarios A, C and D) with minor risk reduction (10%). Consequently, the proportion of people willing to pay higher amounts is larger for the Scenarios B, D and F as they feature more serious physical and psychological consequences (note the different values depicted in X-axes).

The results of survival time calculations are summarised in Table 6:5 (see §6.5.3). The reported statistics include the mean and median values of WTP for each scenario and risk reduction alongside with their corresponding confidence intervals. The mean and CI values denote the survival time restricted to the longest follow up times and the confidence intervals for means and the 50th percentile of survival time respectively. T-tests were used to assess the statistical differences between the estimated WTP values among the Scenarios (in logarithmic transformation of WTP). The variables denoting the WTP amounts were categorised based on the severity of the scenario and the risk reduction; that is for each risk reduction percentage, differences between means were firstly assessed for the scenarios with minor harm descriptors (A, C and D) and then for the with serious harm descriptors. Results suggested that there were no statistically significant differences between these variables at 0.01 level, indicative of homogeneity in the valuations with similar characteristics (e.g. for 10% reduction, WTP for

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Scenario A did not significantly differ from WTP for Scenario C (p= .388) or E (p=.81)). Significant were the differences though between the means of all valuations elicited from Scenarios with serious harm descriptors (B, D and F) compared to those with minor harm descriptors (A, C and E). Moreover, statistical differences at the 0.01 level were found between WTP for reducing the risk of any scenario from happening and the WTP values obtained from all Scenarios for the 10% and 50% risk reduction. Significant were also the differences at the 0.01 level between WTP for reducing the risk of any scenario from happening and the WTP values obtained from all Scenarios with minor harm descriptors for the total prevention, but not between the other mean amounts. This is concordant with the observation of WTP for any scenario being in the same range as WTP for higher risk reduction and serious harm descriptors, as there was not enough evidence to support otherwise (significant differences in the means observed in these cases).

6.5.2.2 Parametric estimates of mean /median WTP

The results of the parametric estimation are presented in Table 6:5 (see §6.5.3). The 95% CIs were calculated using bootstrap estimation for 1000 replications. Briefly, the process entails the use of the original dataset to create multiple simulated datasets, by sampling 1000 times with replacement from the original set of observations. The model is re-estimated for each simulated dataset and a new set of parameters is obtained which is then used to estimate mean and median WTP. The derived estimates are arranged in order and 95% CIs defined as the values falling on the 2½th and 97½th percentiles. Bootstrapping was preferred over other techniques, as the CI construction makes almost no assumptions concerning the nature of the data.

The statistical differences between the estimated WTP values among the Scenarios were assessed using Wilcoxon rank-sum test (also known as the Mann-Whitney U test) for two main reasons; first because the data were non-normally distributed and second because the Wilcoxon rank-sum test analyzes the equality of the sample medians rather than the means (as is done in the two-sample, unpaired t-test)[74]. The tests replicated the findings reported in the non-

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[74] The theory of the test is that if the two samples are similar, their medians will also be similar and the mean ranks will be equal. If one mean rank is larger, then that sample must have larger observations (and therefore a larger

parametric estimation; as there were statistically significant differences in mean WTP for all categories across different risk reductions differences at the 0.01 level but not between the other mean amounts.

6.5.3 Summary of Contingent Valuation estimates

The results of the non-parametric and parametric estimation of WTP measures are presented in Table 6:5. It is observed that the nonparametric approach yielded lower mean WTP estimates than the parametric. This is consistent with the expectation that the non-parametric approach would give values that are more conservative. Table 6:5 also reports the number of observation used for each calculation, information used to obtain the percentage of protesting responses as identified from the collected CV data.

Table 6:5 Summary statistics for WTP (£/individual)

	NON-PARAMETRIC ESTIMATION		PARAMETRIC ESTIMATION		Obs Nº	Protests
	Mean (95% CI)	Median (95% CI)	Mean (95% CI)	Median (95% CI)		
Scenario A: Minor head injuries and short-term distress						
10% risk reduction	82.149 (34.413-129.884)	10 (10-20)	85.723 (78.516-92.931)	31.934 (28.817-35.051)	286	26% (99)
50% risk reduction	183.983 (124.216-243.751)	50 (50-50)	224.759 (204.328 -245.19)	98.938 (89.944-107.931)	331	14% (54)
100% risk reduction	345.157 (242.466-447.848)	100 (100-100)	474.275 (427.396 -521.154)	260.729 (238.436 -283.021)	350	9% (35)
Scenario B: Severe head injuries and long-term distress						
10% risk reduction	225.667 (151.135-300.2)	50 (50-50)	318.923 (291.339 -346.508)	128.204 (117.115 -139.293)	338	12% (47)
50% risk reduction	510.605 (377.377-643.833)	100 (100-150)	804.694 (740.636 -868.753)	326.421 (300.436-352.406)	348	10% (37)
100% risk	1039.331	300	1661.999	697.552	353	8% (32)

median) than the other. The Wilcoxon rank-sum test then quantitates how different the two mean ranks are using the t-statistic.

reduction	(699.19-1379.47)	(200-400)	(1503.732-1820.266)	(631.126 - 763.978)		
Scenario C: Minor torso injuries and short-term distress						
10% risk reduction	74.948 (36.829-113.067)	20 (10-20)	81.049 (72.358-89.740)	35.091 (31.328-38.854)	280	27% (105)
50% risk reduction	186.686 (123.435-249.936)	50 (30-50)	251.132 (227.153-275.110)	96.515 (87.299-105.730)	318	17% (67)
100% risk reduction	331.145 (226.713-435.576)	80 (50-100)	460.004 (412.198-507.810)	185.673 (166.377-204.969)	339	12% (46)
Scenario D: Severe torso injuries and long-term distress						
10% risk reduction	234.727 (155.279-314.174)	50 (50-75)	357.719 (320.833-394.605)	144.411 (129.520-159.302)	333	14% (52)
50% risk reduction	461.450 (357.689-565.211)	150 (100-200)	800.841 (726.171-875.511)	336.103 (304.765-367.441)	342	11% (43)
100% risk reduction	831.838 (669.838-993.837)	300 (250-400)	1581.234 (1384.110-1778.359)	702.819 (615.202-790.436)	351	9% (34)
Scenario E: Minor limbs injuries and short-term distress						
10% risk reduction	89.917 (50.628-129.207)	10 (10-15)	98.801 (85.673-111.929)	39.062 (33.872-44.253)	284	26% (101)
50% risk reduction	186.217 (130.796-241.639)	40 (30-50)	242.064 (214.435-269.693)	96.694 (85.657-107.730)	320	17% (65)
100% risk reduction	383.971 (268.879-499.062)	75 (60-100)	537.827 (480.855 -594.799)	205.364 (183.609-227.118)	341	11% (44)
Scenario F: Severe limbs injuries and long-term distress						
10% risk reduction	257.722 (171.773-343.672)	50 (50-50)	371.183 (334.657-407.710)	142.755 (128.708-156.803)	332	14% (53)
50% risk reduction	488.246 (365.283-611.209)	150 (100-200)	758.825 (673.622-844.028)	326.779 (290.087-363.471)	341	11% (44)
100% risk reduction	815.753 (646.913-984.594)	300 (200-350)	1585.393 (1417.925-1752.861)	660.999 (591.176-730.822)	347	10% (38)
Any Scenario						
100% risk reduction	718.209 (544.726-891.692)	200 (200-300)	1738.130 (1510.329-1965.931)	729.761 (634.118-825.404)	354	8% (31)
Victimisation Programme						

By 10% pm	11.424 (9.176-13.672)	5 (5-5)	14.143 (13.228-15.057)	7.675 (7.178-8.171)	292	24% (93)
By 50% pm	25.639 (21.496-29.787)	10 (10-15)	31.314 (29.343-33.285)	17.553 (16.448-18.658)	322	16% (63)
By 10% pa	119.766 (94.247-145.285)	60 (50-60)	161.014 (150.539-171.489)	80.098 (74.887-85.309)	306	21% (79)
By 50% pa	272.452 (222.875-322.03)	100 (100-120)	386.496 (359.430-413.562)	193.608 (180.050-207.167)	334	13% (51)

In terms of ranking, Scenario B was the most disliked scenario, followed by Scenario F and Scenario D. Fourth, fifth and sixth were Scenarios A, C and E respectively. Table 6:6 presents the summary statistics of the WTA values as determined from the total sample alongside the number of observations and the number of protests met in their calculation. Table 6:6 also presents the monetary amounts on the equivalent of expenditures for coping with the consequences of each scenario and the compensatory amounts that victims should be paid in compensation for their pain and suffering for each of the described scenarios.

Table 6:6 Summary statistics for Willingness to Accept (£/individual), for respondents' out-of-pocket expenditures for each scenario (£/individual; Q8) and for for respondents' suggested compensation for victims for each scenario (£/individual; Q9)

Willingness to Accept	Mean	SD	Median	95% CI		Obs Nº	Protests
				LB	UB		
Scenario A	2902.703	17159.226	250	1165.001	4640.405	377	2.09%(8)
Scenario B	15173.862	53819.854	2000	9664.414	20683.310	369	4.16%(16)
Scenario C	3081.115	17694.840	200	1281.952	4880.278	374	2.86%(11)
Scenario D	14891.507	43844.591	1500	10384.730	19398.283	366	4.93%(19)
Scenario E	3743.914	21927.748	200	1511.355	5976.473	373	3.12%(12)
Scenario F	13248.482	40248.081	1200	9105.689	17391.276	365	5.19%(20)
Any Scenario	26033.335	86252.490	2000	17142.973	34923.697	364	5.45%(21)
Out-of-pocket Expenditures							
Scenario A	1009.191	5595.973	50	446.976	1571.406		
Scenario B	11952.948	61052.052	1000	5819.183	18086.713		
Scenario C	950.543	6991.507	50	248.122	1652.964	383	0.52% (2)
Scenario D	8689.595	54531.553	600	3210.930	14168.260		
Scenario E	1009.522	6761.500	50	330.209	1688.835		
Scenario F	7170.922	24078.483	800	4751.810	9590.034		
Suggested Victim Compensation							

Scenario A	1952.076	7844.464	250	1160.835	2743.317		
Scenario B	17667.205	54928.652	2500	12126.764	23207.646	380	1.31%(5)
Scenario C	2021.068	8829.877	250	1130.433	2911.704		
Scenario D	13704.525	40304.009	2000	9644.588	17764.462	381	1.04%(4)
Scenario E	1734.513	7316.899	200	996.486	2472.540	380	1.31%(5)
Scenario F	14068.673	39918.650	2000	10047.555	18089.792	381	1.04%(4)

The values resulting from the calculations for the three proxies for the intangibles costs described by the definition in section §6.4.2 (p.198) are presented in Table 6:7.

Table 6:7 Summary statistics for proxies denoting intangible costs

Type (I) := |Compensation-Expenditures|	Mean	SD	Median	95% CI		Obs Nᵒ
				LB	UB	
Scenario A	1564.549	6513.695	100	906.666	2222.432	
Scenario B	15772.557	69706.026	960	8732.250	22812.863	379
Scenario C	1514.493	6664.402	100	841.389	2187.598	
Scenario D	12209.787	58545.906	990	6304.488	18115.086	380
Scenario E	1194.504	5329.877	100	656.186	1732.821	379
Scenario F	9711.951	32021.270	790	6482.090	12941.813	380
Type (II) := |WTA-Expenditures|						
Scenario A	2963.376	17396.892	200	1196.883	4729.869	375
Scenario B	18858.719	76630.049	1110	10992.742	26724.696	367
Scenario C	2690.790	17153.838	150	941.922	4439.658	372
Scenario D	14750.479	54599.221	980	9122.736	20378.222	364
Scenario E	3427.504	21550.455	150	1227.414	5627.594	371
Scenario F	12058.675	38075.707	1000	8128.633	15988.717	363
Type (III) := |WTA-WTP for complete prevention|						
Scenario A	2510.577	17013.791	180	773.635	4247.518	371
Scenario B	12962.869	53662.143	935	7337.580	18588.159	352
Scenario C	2697.207	17539.618	100	896.788	4497.627	367
Scenario D	12763.709	40959.843	950	8451.432	17075.987	349
Scenario E	3269.000	21445.010	100	1073.710	5464.290	369
Scenario F	11153.171	38636.185	900	7073.742	15232.601	347

Although there are great numerical differences in the values elicited for question 9[75] and for WTA, Wilcoxon rank-sum test indicated that these differences were only statistically significant

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[75] "*Now we would like to know your opinion on how much victims should be paid in compensation for their pain and suffering for each of the above scenarios. (State your answer in each box)*"

for the suggested monetary equivalent and not for the compensatory amounts (at the 0.01 level of significance). No statistically significant differences were found between intangible costs of type I and type III with one exception (that of Scenario A). Results also indicated that differences were statistically non-significant between intangible costs of type II and type III for scenarios with severe injury profiles (Scenarios B, D and F). The remainder of comparisons indicated statistically significant differences at the 0.01 level.

6.5.4 Econometric analysis of WTP

Table 6:1 described the assumptions on the variables used to model the WTP data. Given that the WTP model (the 2nd part of the present specification) would comprise a regression model, multicollinearity had to be rejected prior to the analysis, as it significantly impacts the quality and stability of the fitted regression model. Multicollinearity can be detected by testing for large correlations between pairs of explanatory variables. Table 6:8 presents the correlation for the set of the variables in the model under the hypothesis that the correlation is zero, where the significant correlations at the 5% level or better are marked with an asterisk.

Table 6:8 Correlation matrix of the control variables in the model (* p<.05; ** p<.01; *** p<.001)

	Male	Age	Low education	Victim	Income	Fear of crime	Difficulty	Poor health	Alcohol misuse
Male	1.000								
Age	0.011	1.000							
Low education	0.016	**-0.406*****	1.000						
Victim	**0.284*****	0.004	-0.009	1.000					
Income	-0.003	**0.564*****	**-0.392*****	-0.001	1.000				
Fear of crime	-0.200*	-0.085	0.046	-0.003	-0.098	1.000			
Difficulty	**-0.106***	**0.173*****	-0.034	-0.029	**0.125****	0.020	1.000		
Poor health	-0.015	0.014	**0.116***	0.045	-0.089	0.078	-0.036	1.000	
Alcohol misuse	0.018	**-0.207*****	**0.249*****	0.088	**-0.169****	-0.020	-0.049	0.059	1.000

Table 6:8 shows that most significant associations (positive or negative) are relatively weak, with the only exception that of income and age, where a relatively stronger positive association is observed. However, none of the observed correlation coefficients exceeded the absolute value of

0.7 that is a common threshold for distinguishing strong associations. Hence, all variables were eligible for being used in the regression model.

6.5.4.1 The spike model (logistic regression)

As previously mentioned, the spike model comprised first part of the specification and it was used to explain whether respondents were generally willing to pay anything for victimisation risk reduction. Results for all twenty-three models are presented in Tables 6:9-6:12 below, where the asterisks denote significance ([+] significant at 10%, * significant at 5%, ** significant at 1%, *** significant at 0.1%).

Table 6:9 Logistic regression models for positive WTP for 10%, 50% and 100% risk reduction in Scenarios A and B

Variable	Coefficient (standard error)					
	P(WTP>0) for Scenario A (Minor head injuries and short-term distress)			P(WTP>0) for Scenario B (Severe head injuries and long-term distress)		
Risk reduction (Model)	*10% (model A1)*	*50% (model A2)*	*100% (model A3)*	*10% (model B1)*	*50% (model B2)*	*100% (model B3)*
Sex	-0.517[+]	-0.468	-0.251	-0.530	-0.421	1.176
	(0.308)	(0.388)	(0.532)	(0.444)	(0.536)	(0.966)
Age	-0.006	-0.020	-0.055*	-0.026	-0.038[+]	-0.108*
	(0.016)	(0.019)	(0.024)	(0.019)	(0.022)	(0.042)
Low Education	-0.098	-0.007	0.027	-0.118	-0.156	-0.881
	(0.329)	(0.420)	(0.580)	(0.463)	(0.566)	(1.139)
Victim	-0.802**	-1.122**	-1.594**	-0.788[+]	-0.934[+]	-3.701**
	(0.31)	(0.379)	(0.527)	(0.433)	(0.518)	(1.311)
Income (log)	-0.210	-0.151	-0.137	-0.108	0.277	-0.140
	(0.266)	(0.337)	(0.477)	(0.382)	(0.467)	(0.887)
Fear of crime	0.795*	0.611	0.997	0.852	0.586	1.055
	(0.346)	(0.441)	(0.678)	(0.534)	(0.607)	(1.206)
Difficulty	-0.105	-0.005	0.536	-0.197	-0.359	1.120
	(0.346)	(0.442)	(0.671)	(0.482)	(0.558)	(1.175)
Poor Health	-0.194	0.046	1.058	-0.522	-0.521	-0.006
	(0.478)	(0.609)	(1.145)	(0.638)	(0.730)	(1.469)
Alcohol Misuse	-0.077	-0.090	0.237	1.454[+]	0.925	-0.224
	(0.359)	(0.456)	(0.710)	(0.781)	(0.806)	(1.324)
Constant	1.763***	2.933***	4.482***	3.330***	4.140***	9.286***
	(0.516)	(0.639)	(0.86)	(0.677)	(0.817)	(2.322)
Statistics						
N	276	276	276	276	276	276

Log likelihood	-145.026	-101.122	-59.017	-81.479	-61.824	-21.679
Pseudo R²	.072	.086	.177	.122	.106	.401
Chi²	22.53**	18.96*	25.47**	22.56**	14.7+	29.06***

Table 6:10 Logistic regression models for positive WTP for 10%, 50% and 100% risk reduction in Scenarios C and D

Variable	Coefficient (standard error)					
	P(WTP>0) for Scenario C (Minor torso injuries and short-term distress)			P(WTP>0) for Scenario D (Severe torso injuries and long-term distress)		
Risk reduction (Model)	*10% (model C1)*	*50% (model C2)*	*100% (model C3)*	*10% (model D1)*	*50% (model D2)*	*100% (model D3)*
Sex	-0.829** (0.300)	-0.670+ (0.360)	-0.715 (0.466)	-0.416 (0.432)	-0.361 (0.484)	1.176 (0.966)
Age	-0.009 (0.016)	-0.032+ (0.018)	-0.054* (0.023)	-0.028 (0.020)	-0.031 (0.021)	-0.108* (0.042)
Low Education	-0.492 (0.325)	-0.347 (0.392)	-0.468 (0.500)	-0.183 (0.462)	-0.136 (0.514)	-0.881 (1.139)
Victim	-0.795** (0.304)	-1.040** (0.354)	-1.380** (0.448)	-1.278** (0.423)	-0.939* (0.470)	-3.701** (1.311)
Income (log)	-0.186 (0.261)	-0.027 (0.319)	0.271 (0.419)	-0.006 (0.380)	0.074 (0.419)	-0.140 (0.887)
Fear of crime	0.538+ (0.324)	0.466 (0.398)	1.065+ (0.587)	0.525 (0.481)	0.533 (0.545)	1.055 (1.206)
Difficulty	-0.108 (0.339)	0.352 (0.436)	0.528 (0.582)	-0.303 (0.465)	-0.068 (0.532)	1.120 (1.175)
Poor Health	0.087 (0.485)	-0.460 (0.519)	0.847 (0.883)	-0.633 (0.590)	-0.276 (0.703)	-0.006 (1.469)
Alcohol Misuse	0.101 (0.355)	0.381 (0.447)	0.687 (0.615)	0.826 (0.606)	0.690 (0.677)	-0.224 (1.324)
Constant	2.125*** (0.518)	3.042*** (0.603)	4.089*** (0.757)	3.601*** (0.699)	3.643*** (0.751)	9.286*** (2.322)
Statistics						
N	276	276	276	276	276	276
Log likelihood	-150.186	-112.294	-74.764	-85.141	-72.679	-21.679
Pseudo R²	0.091	0.108	0.175	0.122	0.082	0.401
Chi²	30.135***	27.316**	31.670***	23.655**	12.976	29.063***

Table 6:11 Logistic regression models for positive WTP for 10%, 50% and 100% risk reduction in Scenarios E and F

Variable	Coefficient (standard error)					
	P(WTP>0) for Scenario E (Minor limbs injuries and short-term distress)			P(WTP>0) for Scenario F (Severe limbs injuries and long-term distress)		
Risk reduction (Model)	*10% (model E1)*	*50% (model E2)*	*100% (model E3)*	*10% (model F1)*	*50% (model F2)*	*100% (model F3)*
Sex	-0.781*	-0.507	-0.450	-0.432	-0.303	1.176
	(0.308)	(0.360)	(0.467)	(0.428)	(0.494)	(0.966)
Age	-0.006	-0.034[+]	-0.057*	-0.027	-0.030	-0.108*
	(0.017)	(0.018)	(0.023)	(0.019)	(0.021)	(0.042)
Low Education	-0.559[+]	-0.229	-0.430	-0.167	-0.097	-0.881
	(0.337)	(0.393)	(0.514)	(0.455)	(0.520)	(1.139)
Victim	-1.235***	-1.126**	-1.758***	-0.939*	-0.864[+]	-3.701**
	(0.311)	(0.355)	(0.469)	(0.417)	(0.481)	(1.311)
Income (log)	0.065	0.146	0.191	-0.182	0.039	-0.140
	(0.278)	(0.321)	(0.431)	(0.365)	(0.427)	(0.887)
Fear of crime	0.512	0.464	0.748	0.937[+]	0.482	1.055
	(0.334)	(0.396)	(0.549)	(0.526)	(0.550)	(1.206)
Difficulty	-0.397	0.156	0.222	-0.079	-0.117	1.120
	(0.345)	(0.423)	(0.555)	(0.475)	(0.536)	(1.175)
Poor Health	0.088	-0.205	1.772	-0.338	-0.387	-0.006
	(0.495)	(0.538)	(1.157)	(0.625)	(0.707)	(1.469)
Alcohol Misuse	0.284	0.144	0.309	0.418	1.095	-0.224
	(0.370)	(0.433)	(0.583)	(0.556)	(0.791)	(1.324)
Constant	2.115***	2.981***	4.371***	3.383***	3.606***(0.755)	9.286***
	(0.538)	(0.600)	(0.801)	(0.672)		(2.322)
Statistics						
N	276	276	276	276	276	276
Log likelihood	-142.624	-112.486	-72.563	-87.036	-70.155	-21.679
Pseudo R²	0.117	0.095	0.179	0.102	0.086	0.401
Chi²	37.661***	23.739**	31.668***	19.866*	13.179	29.063***

Table 6:12 Logistic regression models for positive WTP for any Scenario (left) and to fund 10%-50% victimisation risk reduction (right)

Variable	Coefficient (standard error)				
Model	P(WTP>0) for any Scenario		P(WTP>0) to fund prevention programme for risk reduction		
Risk reduction	*100%*		*10%*	*50%*	*10%*	*50%*
Sex	-0.449 (0.833)		-0.419 (0.317)	-0.108 (0.378)	-0.499 (0.334)	-0.560 (0.429)
Age	-0.072* (0.031)		0.004 (0.016)	-0.023 (0.018)	-0.009 (0.016)	-0.037* (0.019)
Low Education	-1.328 (0.933)		-0.412 (0.332)	-0.323 (0.403)	-0.271 (0.353)	-0.107 (0.454)
Victim	-1.766* (0.849)		-0.402 (0.321)	-0.567 (0.375)	-0.557[+] (0.334)	-0.310 (0.427)
Income (log)	0.023 (0.722)		-0.630* (0.269)	-0.489 (0.314)	-0.647* (0.285)	-0.182 (0.354)
Fear of crime	0.108 (0.891)		0.758* (0.345)	1.188* (0.478)	0.675[+] (0.371)	1.625* (0.643)
Difficulty	-0.198 (0.832)		-0.621[+] (0.333)	0.072 (0.427)	-0.296 (0.361)	-0.018 (0.484)
Poor Health	0.543 (1.306)		-1.050* (0.451)	-0.796 (0.514)	-0.749 (0.471)	-0.997[+] (0.561)
Alcohol Misuse	0.787 (1.165)		-0.489 (0.349)	-0.449 (0.422)	-0.266 (0.380)	-0.127 (0.510)
Constant	7.497*** (1.591)		2.118*** (0.531)	2.979*** (0.604)	2.566*** (0.551)	3.506*** (0.651)
Statistics						
N	276		276	276	276	276
Log likelihood	-30.581		-143.524	-106.693	-130.402	-85.813
Pseudo R²	0.229		0.088	0.094	0.081	0.133
Chi²	18.159*		27.678**	22.021**	23.006**	26.411**

6.5.4.2 The WTP model (Multiple regression)

The second part of the specification for WTP uses multiple regression analysis to model the level of WTP from the respondents with positive WTP. Results for all twenty-three models are presented in Tables 6:13-6:16 below, where the asterisks denote levels of significance ([+] significant at 10%, * significant at 5%, ** significant at 1%, *** significant at 0.1%).

Table 6:13 OLS regression conditional on positive WTP for WTP amount for all risk reductions in Scenarios A and B

Variable	Coefficient (standard error)					
Model	WTP for Scenario A (Minor head injuries and short-term distress)			WTP for Scenario B (Severe head injuries and long-term distress)		
Risk reduction	*10%*	*50%*	*100%*	*10%*	*50%*	*100%*
Sex	-0.545*	-0.384+	-0.448*	-0.549**	-0.369+	-0.224
	(0.212)	(0.198)	(0.188)	(0.205)	(0.202)	(0.193)
Age (log)	1.025*	0.499	0.684+	0.494	0.200	0.373
	(0.404)	(0.396)	(0.386)	(0.414)	(0.401)	(0.393)
Low Education	-0.151	-0.244	-0.318	-0.224	-0.168	-0.096
	(0.216)	(0.208)	(0.202)	(0.217)	(0.213)	(0.207)
Victim	-0.059	0.048	-0.009	-0.085	0.057	0.205
	(0.226)	(0.212)	(0.202)	(0.217)	(0.212)	(0.203)
Income (log)	0.127	0.317+	0.325*	0.285+	0.356*	0.400*
	(0.168)	(0.161)	(0.156)	(0.167)	(0.165)	(0.161)
Fear of crime	-0.146	-0.106	0.146	-0.181	0.024	0.220
	(0.195)	(0.189)	(0.181)	(0.194)	(0.191)	(0.186)
Difficulty	-0.053	-0.365+	-0.341+	-0.115	-0.042	-0.037
	(0.217)	(0.208)	(0.199)	(0.215)	(0.212)	(0.205)
Poor Health	-0.073	-0.273	-0.389	-0.070	-0.024	-0.166
	(0.325)	(0.306)	(0.285)	(0.319)	(0.311)	(0.294)
Alcohol Misuse	-0.521*	-0.249	-0.326	-0.250	-0.231	-0.181
	(0.231)	(0.219)	(0.209)	(0.218)	(0.216)	(0.213)
Constant	-0.858	0.713	0.794	1.139	2.392+	2.117+
	(1.254)	(1.219)	(1.189)	(1.292)	(1.251)	(1.220)
Statistics						
N	205	237	253	244	251	256
R^2	0.159	0.123	0.174	0.116	0.083	0.095
Adjusted R^2	0.120	0.088	0.143	0.082	0.049	0.062
Root MSE	1.302	1.343	1.335	1.407	1.401	1.381
F-statistic	4.10 ***	3.54 ***	5.69 ***	3.42 ***	2.42 *	2.87 **

Table 6:14 OLS regression conditional on positive WTP for WTP amount for all risk reductions in Scenarios C and D

Variable	Coefficient (standard error)					
Model	WTP for Scenario C (Minor torso injuries and short-term distress)			WTP for Scenario D (Severe torso injuries and long-term distress)		
Risk reduction	*10%*	*50%*	*100%*	*10%*	*50%*	*100%*
Sex	-0.465*	-0.429+	-0.563**	-0.526*	-0.414*	-0.293
	(0.224)	(0.223)	(0.204)	(0.204)	(0.198)	(0.188)
Age (log)	1.273**	0.803+	0.894*	0.679+	0.429	0.337
	(0.432)	(0.449)	(0.418)	(0.408)	(0.393)	(0.384)
Low Education	-0.090	-0.271	-0.373+	-0.244	-0.305	-0.187
	(0.224)	(0.233)	(0.216)	(0.215)	(0.208)	(0.202)
Victim	-0.139	-0.069	0.073	-0.096	-0.017	0.099
	(0.237)	(0.237)	(0.219)	(0.218)	(0.208)	(0.198)
Income (log)	0.084	0.304+	0.292+	0.352*	0.342*	0.559***
	(0.178)	(0.176)	(0.166)	(0.165)	(0.161)	(0.157)
Fear of crime	-0.008	0.040	0.140	-0.028	0.120	0.299
	(0.204)	(0.210)	(0.193)	(0.193)	(0.188)	(0.182)
Difficulty	0.169	-0.298	-0.295	0.015	-0.084	-0.065
	(0.228)	(0.226)	(0.212)	(0.214)	(0.207)	(0.201)
Poor Health	0.093	-0.126	-0.383	0.083	0.011	-0.096
	(0.334)	(0.353)	(0.305)	(0.321)	(0.304)	(0.288)
Alcohol Misuse	-0.346	-0.240	-0.231	-0.300	-0.147	-0.154
	(0.239)	(0.238)	(0.222)	(0.218)	(0.213)	(0.208)
Constant	-1.587	-0.411	0.090	0.098	1.821	1.232
	(1.326)	(1.372)	(1.280)	(1.277)	(1.221)	(1.191)
Statistics						
N	196	228	245	241	247	257
R²	0.151	0.134	0.177	0.157	0.119	0.155
Adjusted R²	0.110	0.098	0.145	0.124	0.085	0.125
Root MSE	1.328	1.447	1.405	1.389	1.368	1.349
F-statistic	3.69 ***	3.74 ***	5.60 ***	4.77 ***	3.55 ***	5.05 ***

Table 6:15 OLS regression conditional on positive WTP for WTP amount for all risk reductions in Scenarios E and F

Variable	Coefficient (standard error)					
Model	WTP for Scenario E (Minor limbs injuries and short-term distress)			WTP for Scenario F (Severe limbs injuries and long-term distress)		
Risk reduction	*10%*	*50%*	*100%*	*10%*	*50%*	*100%*
Sex	-0.488*	-0.385+	-0.374+	-0.358+	-0.367+	-0.254
	(0.236)	(0.215)	(0.209)	(0.209)	(0.198)	(0.195)
Age (log)	1.665***	1.356**	1.019*	0.824+	0.758+	0.575
	(0.438)	(0.426)	(0.419)	(0.425)	(0.393)	(0.397)
Low Education	-0.067	-0.153	-0.276	-0.163	-0.109	-0.089
	(0.234)	(0.225)	(0.220)	(0.221)	(0.209)	(0.209)
Victim	-0.295	-0.202	-0.124	-0.161	-0.085	0.130
	(0.252)	(0.228)	(0.225)	(0.222)	(0.208)	(0.206)
Income (log)	0.079	0.172	0.225	0.259	0.459**	0.441**
	(0.183)	(0.171)	(0.169)	(0.172)	(0.162)	(0.164)
Fear of crime	0.080	0.083	0.152	-0.035	0.118	0.270
	(0.216)	(0.202)	(0.198)	(0.199)	(0.189)	(0.189)
Difficulty	-0.070	-0.308	-0.211	0.095	-0.079	-0.008
	(0.240)	(0.219)	(0.217)	(0.221)	(0.209)	(0.208)
Poor Health	-0.042	-0.056	-0.333	0.130	0.171	-0.003
	(0.352)	(0.334)	(0.310)	(0.328)	(0.304)	(0.297)
Alcohol Misuse	-0.327	-0.390+	-0.379+	-0.290	-0.138	-0.257
	(0.250)	(0.233)	(0.229)	(0.226)	(0.213)	(0.217)
Constant	-2.780*	-1.368	0.118	0.077	-0.201	1.071
	(1.359)	(1.301)	(1.291)	(1.318)	(1.225)	(1.232)
Statistics						
N	201	230	248	243	246	254
R²	0.177	0.172	0.158	0.119	0.154	0.128
Adjusted R²	0.138	0.138	0.126	0.085	0.122	0.096
Root MSE	1.410	1.408	1.445	1.442	1.368	1.392
F-statistic	4.56 ***	5.08 ***	4.95 ***	3.51 ***	4.79 ***	3.98 ***

Table 6:16 OLS regression conditional on positive WTP for any Scenario and to fund 10%-50% victimisation risk reduction

Variable	Coefficient (standard error)				
Model	WTP for any Scenario	WTP to fund prevention programme for risk reduction			
Risk reduction	*100%*	*10%*	*50%*	*10%*	*50%*
Sex	-0.332+	0.011	-0.010	0.020	-0.040
	(0.193)	(0.188)	(0.166)	(0.195)	(0.178)
Age (log)	0.818*	0.299	0.160	0.382	0.308
	(0.402)	(0.391)	(0.358)	(0.405)	(0.385)
Low Education	-0.006	-0.206	-0.356*	-0.384+	-0.413*
	(0.207)	(0.199)	(0.178)	(0.207)	(0.190)
Victim	0.010	-0.150	0.044	-0.013	0.163
	(0.202)	(0.199)	(0.177)	(0.205)	(0.187)
Income (log)	0.566***	-0.001	-0.043	-0.077	-0.054
	(0.161)	(0.162)	(0.140)	(0.163)	(0.148)
Fear of crime	0.270	0.221	0.293+	0.125	0.220
	(0.188)	(0.174)	(0.156)	(0.180)	(0.167)
Difficulty	0.049	-0.147	-0.207	-0.105	-0.183
	(0.208)	(0.204)	(0.174)	(0.205)	(0.186)
Poor Health	-0.152	0.447	0.132	0.162	-0.022
	(0.297)	(0.345)	(0.281)	(0.333)	(0.297)
Alcohol Misuse	-0.221	-0.465*	-0.507**	-0.384+	-0.517**
	(0.211)	(0.218)	(0.191)	(0.219)	(0.199)
Constant	-0.720	0.826	2.484*	3.393**	4.383***
	(1.234)	(1.180)	(1.078)	(1.243)	(1.163)
Statistics					
N	255	203	231	215	239
R²	0.187	0.072	0.091	0.066	0.096
Adjusted R²	0.157	0.029	0.054	0.025	0.060
Root MSE	1.369	1.167	1.116	1.237	1.212
F-statistic	6.24 ***	1.67 +	2.47 *	1.60	2.69 **

6.6 Discussion

This chapter set out to investigate the monetary values of risk reduction of assault-related injuries assigned by a UK based sample to victimisation risks, in terms of injury severity and psychological outcome. The research aimed at (i) producing monetary estimates regarding victimisation risk reductions using WTP as a vehicle and the appropriate estimation techniques thereon, (ii) examining the elicited values across the scenarios presented in the survey instrument and (iii) specifying a WTP bid function tailored to the data obtained in the survey.

It should be noted that the employed sampling technique implied that the sample was not representative of the population. Thus, the valuation results should not be regarded as such but instead as a point of reference in further research. Nonetheless, the survey design secured diversity in the sample as no assumptions were made as to who will participate and the same information was collected for every participant. In addition, the type of the collected information followed that of previously published CV studies, thus all aspects considered influential in the valuation were accounted for (e.g. income, victimisation experience). The sample size also acted in favour of the survey as a relatively large number of observations was collected, exceeding by more than 70% the recommended minimum sample size for a CV survey with OE questioning format. To compensate for the usage of convenience sampling and to control uncertainty and bias, the characteristics of the sample in this study were compared to those reported in a number of UK-based large scale surveys. Although the survey addressed the individual, a comparison with the metrics available in England and Wales with respect to the characteristics of the general population would be of value.

The reported income figures compared well with those from the General Household Survey (GHS) 2006 dataset (n_{tot}= 22,924), where the individual's income was estimated between £751.09 (net; SD= 1,202.65) and £1,006.08 (gross; SD=2,216.25) per month. According to the Office for National Statistics (ONS 2011) the average expenditures of UK households was approximately £480 per week in 2010, including expenditures for recreation purposes (approximately £60 a week). Alcoholic drink purchases contributed £12 to weekly household

expenditure. In terms of alcohol units, 16.4 units for men and 8.0 units for women[76] is the national average per week (NHS Lifestyles Statistics 2011). Regarding educational attainment, as expected from the formulation of the sample, the rates were somewhat higher from the average 19.87% of the GHS 2006 total sample that was reported as having a higher education. The BCS 08/09 (n_{tot}=52,600) reported similar percentages, with respondent's education being Apprenticeship or A/AS level by 17.10% and University Degree or Diploma by 32.15%. Regarding general health characteristics, the findings were in agreement with the general self-ratings of *'good health'* reported by 62.41% of the sample in the GHS 2006 and by 76.32% of the sample in the BCS 08/09. The data from the victimisation module compared well to the corresponding 30.69% of victims in the total sample recorded in the BCS 08/09 dataset (see Chapter 4). Furthermore, according to the 2010/11 BCS, 21.5% of adults were victims of at least one crime in the 12 months prior to interview, similarly to the 2009/10 BCS rates.

The above figures indicate that although the sampling was not random, the sample approximates the properties of the general population and hence mitigates some of the concerns regarding sample's representativeness. However, the representative properties of the sample limit to the characteristics noted above; i.e. income and expenditures, educational attainment and prior victimisation experiences. What should be noted is that some of the remaining characteristics (younger age, marital and occupational status) constitute the stated preferences as a valid representation of only those specific segments of the general population that correspond to these characteristics. In connection to this, the optimal solution would be to describe the possible effects of the subjects that were underrepresented to the results as this would help in estimating the possible difference between the results reported here compared to those that would be potentially retrieved from the entire population. Given that this was not feasible in the context of this research, the reliability of the derived values was assessed instead. As discussed later on, the produced values conformed to prior expectations and to some extent compensate for the loss in external validity incurred by the sampling technique. Regarding the reliability of the derived values per se, the moderate confidence scores coupled with the reportedly reasonable difficulty in answering the CV questions acts in favour of the reported values. That is

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[76] One unit of alcohol is 8mg (or 10ml) of pure alcohol, e.g. a half pint of normal strength beer, lager or cider is 1 unit of alcohol.

because the scores suggests that the nature of the process respondents used to arrive at a number was not one-dimensional or shallow that would be the case if the sample indicated that they were not confident in their responses but still found the questions easy to answer (Schkade & Payne 1994).

6.6.1 On the estimation exercise

The non-parametric estimation indicated that the mean WTP increases (i) with the severity of the outcome in the Scenarios, and (ii) the specified risk reduction. This is concordant with prior expectations, as logically people would pay more for avoiding an event of higher risk occurrence and of greater severity. Since no timeframe was specified in the questions on the Scenarios A-F it was assumed that the answers reflect the price of onetime payment specific to each respondent (see Chapter 3). The harm descriptors appeared to play major role in the formation of the WTP as even for smaller risk reduction percentages, the difference between the elicited means was large. That is, the WTP for a 10% risk reduction in Scenarios A, C and D, which describe a minor injury profile, was considerably lower compared to that of Scenarios B, E and F for the same risk reduction. In more detail, the WTP for 10% risk reduction for Scenarios A (minor: head injuries & psychological harm) was estimated to £82.149, whereas for the same percentage the WTP for Scenario B (significant: head injuries & psychological harm) equalled almost three time this amount (£225.667). This was the case with the remainder of the scenarios, as all WTP values stated for a 10% risk reduction in profiles with significant injuries were approximately three times their minor injury profile counterpart. That is the 10% risk reduction in Scenario C (minor: torso injuries & psychological harm) and Scenario E (minor: limb injuries & psychological harm) was valued as £74.948 and £89.917 respectively, compared to £234.727 and £257.722 calculated for Scenarios D (significant: torso injuries & psychological harm) and F (significant: limb injuries & psychological harm) respectively. The WTP for the prevention of any Scenario was estimated at £718.209, amount within the range of the WTP for the total prevention of Scenarios with greater harm descriptors.

The most important finding was the great disparity observed between the mean and median WTP values regardless of the Scenario under evaluation. Although means and medians followed

the same pattern for increase, in all cases, the median was significantly smaller than the mean, indicative of a positive skew in the distribution of the WTP data. Put another way, all WTP valuations as elicited from the study's sample were skewed to the left with a long tail of low scores pulling the mean down more than the median. This was concordant with prior expectations as the customary approach for approximating the distribution of WTP data entails the use of lognormal distribution given that WTP amounts are non-negative and present a skewed distribution. As previously discussed, the median value is regarded as a more relevant and robust WTP measurement as it is not influenced by larger observations. Hence, it denotes the most dominant value of the dataset, which corresponds to the amount that received the majority of support[77] and produces a much more parsimonious measure of value. In terms of their numerical values, the medians for the Scenarios with minor harm descriptors ranged from £10 to £20 for 10% risk reduction, £40 to £50 for 50% risk reduction and from £75 to £100 for a complete prevention. For Scenarios with serious harm descriptors, the median values remained constant across the risk reductions regardless of the Scenario description, ranging from £50 to £300 with the only exception the median for the 50% risk reduction in Scenario B, which was lower compared to the medians obtained for the rest of the scenarios. In essence, results indicated that 50% of respondents in the sample were prepared to pay at least £50 to reduce by 10% the risk of any of the scenarios with serious harms descriptors from happening and at least £300 to completely prevent it (see Table 6:5).

Following prior expectations, the parametric estimation provided inflated figures of WTP showing once more that WTP increases with the severity of the outcome and the risk reduction specified in the Scenarios. The findings were in line with the non-parametric estimation, as the WTP values were clearly distinguished across the different scenarios primarily based on the harm descriptors whereas they were similar across the risk reductions. That is, for 10% risk reduction in scenarios with minor injury profile (A, C and D) the WTP ranged from £81 to £99, whereas for 50% and 100% risk reduction in the same scenarios the WTP ranged from £225 to £251 and from £460 to £538 respectively. Similarly, for the scenarios with significant injury profile (B, E and F), the WTP for 10% reduction ranged from £319 to £371, whereas for 50% and 100% the WTP ranged from £759 to £805 and from £1,581to £1,662 respectively. The WTP for the

[77] In this case the median also equals the mode as all WTP values were put in ascending order prior to any analyses.

prevention of any Scenario surpassed all estimations and was estimated at £1,738. None of the scenarios across the injury profiles were consistently valued more than others were, with the only exception of valuing the reduction in the risk of any Scenario. Scenario B was slightly ahead of all the other valuations, indicating that WTP is higher when head is the body part to be injured. However, scenarios with significant harm descriptors were overall valued distinctively more compared to those with minor harm descriptors. Moreover, it is observed that Scenario E obtained overall higher WTP amounts across scenarios with minor injury profile. This can be explained as people valuing more slight injuries in limbs as these can be more influential on usual daily activities compared to those in head or torso. Although Scenarios explicitly described the type of injuries one would sustain if it was endured, responses could be influenced by the individuals' metrics of slight and severe injury. However, since this did not emerge from the think-aloud sessions during pre-testing, no technique could correct for this issue at this stage of the research.

The stated values increased with risk reduction, on most occasions reaching double the amount previously stated. The best example is that of Scenario D, where the WTP for 10% risk reduction was approximately £358, while for 50% and 100% was £801 and £1581; i.e. the percentage of increase in the stated WTP values closely followed the percentage of risk reduction. This however, has a two-fold interpretation. One pertains to the fact that the initial WTP value is in a way a starting point, hence, as a reference and to ease valuation respondents used it for the remaining risk reduction percentage creating their own valuation referral. Another interpretation though is that if indeed that was the case, then the stated valuations are considered to confirm internal validity. Either way, both interpretations point towards considering the initial valuation of 10% reduction as the most reliable one, given that both the remaining percentages are deemed very high to be conceptualised and hence realistic. It should be noted that truncation (typically met in parametric estimates) tends to overestimate WTP as in essence it excludes zero values from the estimation, hence making the overall estimates more susceptible to outlier values that were not captured by the initial set of restrictions. Although the spike parameter corrects for this issue in this study, mean values are still considered less reliable; therefore, the focus should be on median estimates, which tend to be more stable as they are not as influenced by extreme

outliers. This also complements previous observations; hence, the most consistent measure of WTP in this study would be considered that of the median and not of the mean.

Overall, the estimation of WTP showed the extent of the dispersion between the stated valuations hence indicating that WTP varies extensively across respondents. This phenomenon has been granted in theory especially for mixture models (An & Ayala 1996) and constitutes a common trait in CV, regardless of the valuation product (see e.g. Donaldson et al. 1995; Thompson et al. 2002; Atkinson, Healey & Mourato 2005; Amponin et al. 2007; Abdullah & Jeanty 2009; Soeiro & Teixeira 2010). In the context of crime, the results of the non-parametric estimation are in line with the non-parametric estimates in the Atkinson, Healey and Mourato's (2005) study as similar patterns were demonstrated in their calculation. More specifically, their WTP mean and median values (see Table 2:1; Chapter 2) per individual for moderate injury were comparable and in the same range to those reported in this study for Scenarios A, C and D. However, that was not the case for the values reported with the Scenarios with significant injury (B, D and F) as theses were higher compared to those in Atkinson, Healey and Mourato (2005) for serious injury profile. Similar was observed with their parametric estimates we these were significantly lower than the values reported here for the scenarios with a corresponding severity profile. However, it should be noted that Atkinson, Healey and Mourato (2005) employed a £3,000 upper limit to their CV data (only values under £3,000 were used in their estimation exercise) without any further information as to the limits' justification. Whether the WTP values reported here constitute an overestimation or the results by Atkinson, Healey and Mourato (2005) an underestimation remains open to discussion. Further study in quantifying such costs using CV will answer this, as it will provide the means for a more exhaustive and detailed comparison. Nonetheless, considering the differences in the frameworks of both studies can account for some of the observed variation in the WTP estimates. For example, Atkinson, Healey and Mourato (2005) used interviews and provided a more detailed description of the expected outcomes to their respondents. If the comparison was to be exact, then only the 50% reductions are comparable since that was the percentage used in their study. In addition, they used a seemingly arbitrary value for their setting their boundary system while this study employed a completely different cut-off point, tailored to suit the income registered by each of

the respondents. Notably, if this study employed the same upper limit of £3,000, all estimations would be considerably lower.

6.6.2 On WTP determinants

To assess and consequently appreciate the factors underlying the extent of the dispersion between the stated valuations, WTP data were parametrically modelled using a mixture model with two specifications (see eq. 8). The first specification explored the situation of respondents providing zero WTP using logistic regression. The results of the regression analysis were used to assess how the variables of the full theoretical model influence the probability of observing a zero WTP value across the respondents in the sample. In essence, the logistic regression model was used to determine the variables that significantly acted on the decision of providing a zero WTP value. To assess the WTP determinants, this study employed the second part of the specification, which in essence used the same independent variables on a model conditional on positive WTP. By excluding the zero observations, the second part of the specification described the situation where the respondents' decision on paying a non-zero amount preceded the stated valuations. The same variables were used as independent in both types of regression as there was no theoretical explanation for justifying an otherwise assumption. Their selection and definition were based on the available literature (see Table 6:1). Their coefficients in the models implied the directions of effects on the respondent's willingness to pay.

In essence, the two parts described above transformed the OE type elicitation of WTP to a referendum-type, where respondents are firstly asked whether they would be willing to pay anything at all before the valuation question instead of directly being asked to state their WTP value. If the analysis adopted the referendum type, then instead of OLS interval regression would be employed by substituting the obtained WTP amounts with intervals according to their numerical value. This would translate to questions in the survey being asked as "*Would you be willing to pay an amount between* [value X and value Z (X≤WTP<Y)] *to reduce the risk of the scenario* [A-F] *happening to you by* [10%-50%-100%]?" A number of authors suggest such a decomposition of WTP (An & Ayala 1996; Frew, Wolstenholme & Whynes 2001; Borisova & Goodman 2003; Sillano & de Ortúzar 2005; Barnighausen et al. 2007; Amponin et al. 2007) as it provides a more

thorough look into the elicited valuations and performs better compared to single specifications[78] (see e.g. Donaldson et al. 1998; Jones 2000).

The two-part specification aids in examining the effects of individual attributes on two different levels of WTP outcomes. The logistic regression tackles the respondent's decision of paying on not paying for victimisation risk reduction whereas the OLS regression models the level of the WTP amount given that the decision denoted by the previous models was yes. Consequently, the logistic model describes a dichotomous event whose results demonstrate how individual attributes affect individuals' stated responses regarding decisions to pay for reductions in victimisation risks. The results from the logistic regression varied in terms of coefficients' directions, as they did not maintain the same signs throughout the whole analysis. Males were found to be less likely to have a positive WTP values except for the cases where their WTP would guarantee a complete prevention of the scenarios with serious harm descriptors (B, D and F). Age was consistently liked with negative likelihood of observing positive WTP indicating that older respondents were less likely to state positive WTP values. Low education followed a similar pattern with respondents of low education being less likely to produce a positive WTP. Concerning individuals with different levels of education, the results in this study are in line with the result in Sorensen et al. (2007). Income, difficulty in answering the CV module of the questionnaire and poor health were among the variables negatively associated with positive WTP probabilities, hence denoting a declining relationship between those and likelihood of observing positive WTP. Positive but not significant association with the probability of having positive WTP was obtained by the respondents with increased FoC and respondents more prone to alcohol misuse, as they were found more likely to have a positive WTP value. However, the most substantial relationship in the models was universally obtained by respondents with previous experience of victimisation. Interestingly, respondents that have identified themselves as crime victims were less likely to produce positive WTP values at the 5% or higher.

Overall, the results from the logistic regression analysis were mixed, given that the coefficients in most cases were not consistently signed and very few associations remained significant throughout the examined models. The most important finding was that victims of crime were

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[78] A more thorough presentation of the conflicts between choosing generalised Tobits or sample selection and two-part model specifications can be found in Jones (2000).

consistently and significantly associated with the likelihood of providing zero valuations ceteris paribus. While the initial hypotheses on the signs of the coefficient refer to the results of the level of WTP bid (the WTP model) consistency was assumed for the spike model. However, the finding that victims were more likely to respond with zero valuations provides evidence against this speculation, as being a victim was generally assumed to positively influence WTP assuming that it would be positive.

Turning to the second part of the specification, the level of WTP conditional on positive values was modelled using Ordinary Least Squares techniques for multiple regression employing the logarithm of the positive WTP values corresponding to each model as the dependent variable. Gender, age, low education, previous victimisation experience, income, FoC, difficulty in answering the questionnaire, poor health and alcohol misuse were the employed covariates[79]. Taking into account the results from all the models altogether, the variables denoting gender, age, income and alcohol misuse were found to have a significant effect on WTP (at the 5% level or higher) regardless of directionality. The sex coefficient was consistently significant, signalling the importance of gender in stating a positive WTP amount. Males were negatively associated with WTP, indicating that women are willing to pay more than men while men consistently provided lower WTP bids. Age was another significant determinant of the amount of WTP; older people were constituently associated with higher WTP amounts. Low education verified the initial expectations as it was consistently negatively signed throughout the analysis; however none of its coefficients was found to be significantly associated with WTP (with the results regarding the victimisation programme being the only exception). Unlike the initial expectations, being a victim of crime was on most occasions negatively associated with WTP with the association being not significant. This suggests that the experience of victimisation in the current dataset not only did not affect WTP but also maintained a negative relationship with it. Income, on the other hand, was in accordance with previous expectations, showing a significantly positive influence on WTP at the 10% level or better. FoC was consistently linked with positive coefficients in the majority of the models albeit without significant effect, hence partially verifying prior expectations. Finding the questionnaire difficult maintained a negative coefficient

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[79] Each one was appropriately transformed to satisfy the normality assumptions of multiple linear regression before inserted in the models.

suggesting that respondents with difficulty in answering the CV module were associated with lower WTP amounts. Poor health appeared to influence negatively WTP, suggesting that respondents with lower health scores attribute lower values for reducing crime risks, albeit without significant effect. Similarly, alcohol misuse was negatively but not significantly associated with WTP. In all, low education, previous victimisation, difficulty in answering the questionnaire, poor health and alcohol misuse were all negatively associated with the WTP level. However, none of those effects was further accredited with a high p-value. Only alcohol misuse was on occasions accompanied with a statistical significance of 5% or better, the importance of that finding though was undermined by the considerably lower values of R^2 observed for the related models.

The initial assumption on the directionality of the effects (see Table 6:1) entailed that the coefficients of the variables denoting previous victimisation, income and FoC would be positively signed whereas low education and difficulty in answering the questionnaire would have a negative effect on the WTP level. The results corroborated with the initial assumptions with one exception, that of previous experience with victimisation. Surprisingly, being a victim of crime had a negative effect not only on stating a higher WTP value but in stating a positive WTP as well. Considering that a similar result was also observed in the first part of the specification, it can be assumed that the victims in the sample of this study were less likely to provide a non-zero WTP value and those that did were associated with lower WTP amounts. Hence, in this study victimisation is considered to have an overall negative effect on WTP with victims being less prone to provide high valuation compared to the non-victim population. Evidence was inclusive as to whether this finding questions the initial assumption, whether it evidences the greater importance of other WTP determinants or whether it arises due to the small number of victims in the sample (see Atkinson, Healey & Mourato 2005).

The modelling exercise showed an overall reasonable fit to the WTP models. The comparatively low number of total observations used in each model should be noted as it accounts for the obtained low R^2 scores. A large number of observations was omitted not only due to the initial limitations imposed on the sample, but also due because only positive WTP valuations were used in the second part of the WTP specification. However, the computed F-

statistics suggests that the models do not fail to represent reality as they were found to be statistically significance at the 5% level of better (with few exceptions detailed later). In all, the scores of the statistics employed as measure of the explanatory power of the entire model suggest that the included control variables provide an acceptable explanation of the distribution of WTP in the sample, albeit the WTP values returned from the CV survey show little in the way of distinguishable patterns.

Taking all the WTP models as a whole, the estimates are quite robust in terms of signs and significance levels. Two issues should be noted though. First, the non-representativeness of the sample with respect to demographic characteristics (age, education) and second, that with these types of models any conclusion on how well they fit the data will be debatable due to the characteristics of WTP (Stewart et al. 2002). The models reported here did explain some of the observed variation and their suitability was based on maximum likelihood procedures, following the methodology suggested by Bateman et al. (2002). The key determinants of WTP comprised demographics variables, namely gender, age and income and the signs of their coefficients were consistent with standard economic theory predictions. However, the predictions can only be regarded as inductive inferences rather than deductive enthymemes as would be the case with a sample representative of the population. The strength of those statistical inferences is determined by the degree to which the sample is representative of the general population. In this case, it should be noted that respondents tended to be younger (mean age: 27 years, median age: 23 years) than the population average and tended to have higher academic achievement than the population as a whole. On the other hand, the effects reported in this study compare well with the WTP literature as similar relationships have been previously reported not only in the context of crime (e.g. Atkinson, Healey & Mourato 2005; Ludwig & Cook 1999, 2000; Cook & Ludwig 2001; Cohen et al. 2004) but in health (Bärnighausen et al. 2007) and environmental studies (Thompson et al. 2002; Wang & Mullahy 2006; Wang & Zhang 2009). Thus, the extent to which any demographic or academic variables might have influenced participant responses cannot be fully assessed.

6.7 Conclusions

This study used a stated preferences survey to determine how much a UK sample (n=385; drawn from the Cardiff general population) would be willing to pay to reduce victimisation risks or to avoid the certain situations communicated via scenarios describing a plausible set of consequences related to violent assaults. Contingent valuation was employed to obtain and analyse the data representing victimisation values, a method primarily used in environmental and health contexts. The study used an econometric approach that entailed a twofold application of parametric and non-parametric techniques to estimate mean and median values of WTP for victimisation risk reduction and reached estimates that confirmed initial expectations. In both estimation techniques, WTP reportedly increased with the severity of the outcome in the Scenarios, and the specified risk reduction.

The valuation results showed that WTP varied extensively across respondents. The modelling exercise showed that women are willing to pay more than men and a statistically significant relationship was found between gender and WTP to reduce victimisation related risks. WTP was increasing with education level and age, yet age was negatively associated with the possibility of stating positive WTP value. Consequently, education tends to increase the probability of support, but the effects are imprecisely estimated. Income was negatively associated with the probability of stating positive valuations but the association was not always significant. Against initial assumptions, age was negatively associated with the probability of stating positive valuations but positively associated with the level of WTP. Health was positively related to WTP at all times but the association was not statistically significant. FoC and previous experience of victimisation did not follow the same direction as FoC maintained a positive sign and a strong association with WTP whereas previous victimisation was consistently negatively associated with WTP. Possible alcohol misuse did not demonstrate a strong association with WTP, but it was found to be positively associated with the probability of stating positive valuations. Finally, difficulty in completing the CV module of the questionnaire was at all times negatively associated with WTP, suggesting that respondents who found the questions difficult to answer were very conservative in their WTP choices, consequently providing a good indicator of internal validity of the obtained responses.

Chapter 7
General Discussion

"If there were only one truth, you couldn't paint a hundred canvases on the same theme."   Pablo Picasso (1966)

This research set out to investigate victimisation with reference to antecedents and risk factors and to bridge some of the existing gaps in the knowledge on the costs associated with the intangible impacts of violent crime. The research began with a review of the cost of crime literature and identified the qualitative effects of crime on human behaviour as these form the background for the appraisal of methodologies for assessing such costs (Czabacski 2008). The long lasting consequences of crime are psychological facts that shape people's behaviour and thus cannot be ignored in any estimation exercise. However, there is a lack of targeted approaches in the literature that combine epidemiological and valuation techniques to achieve such cost estimation. Studies so far mostly focus on the effects of various crime types on victims (Davis & Friedman 1985; Weiss & Ephross 1986) and nearly all the empirical research is in the context of direct personal traumas, such as the type of the experienced crime, the provided victim support and the adopted coping strategies (Green, Streeter & Pomeroy 2005). From an epidemiological point of view, demographic characteristics such as gender, race and age have been identified as significant risk factors for violent victimisation (Loeber, Kalb & Huizinga 2001; Gabbidon & Greene 2009; Sivarajasingam et al. 2009). However, there was not enough evidence to suggest that victimisation risks alone would reflect all denominators for studying victim costs. Despite the importance of such an assessment, it could not be regarded as the sole source of information for examining potential intangible costs. This research sought to account for this gap assuming that investigating the outcomes of victimisation would be a useful source for revealing intangible influences.

7.1 Studying victimisation: research findings and implications

The trauma of victimisation and the psychological aftermath of a violent incident have been the focus of vigorous research. There is a plethora of published literature on the severity of the physical and psychological trauma sustained by victims and on the multidimensional consequences of victimisation (Davis & Friedman 1985; Kilpatrick et al. 1985; Wirtz & Harrel 1987; Lurigio & Resik 1990; Norris & Kaniasty 1991; Craig-Henderson & Sloan 2003; Green, Streeter & Pomeroy 2005; Russo & Roccato 2010). Evidence is mounting that violent victimisation can be an extremely stressful event, leaving many victims with significant levels of psychological emotional stress (Atkeson et al. 1982; Kilpatrick et al. 1985; Cook, Smith & Harrel 1987; Frieze, Hymer & Greenberg 1987; Burnam et al. 1998; Green & Pomeroy 2007; Roberts & Green 2007). Literature suggests that violent crime has a direct effect on psychological distress and an indirect effect through its impact on beliefs about safety, esteem and trust (Norris & Kaniasty 1991). The long-term psychological outcome of a violent event is a greatly researched field that identifies posttraumatic stress disorder (PTSD), depression, anxiety disorders, substance abuse and counter-phobic behaviour (Rothbaum et al. 1992; Yehuda & McFarlane 1995) as the typical psychological responses. The difference between short- and long-term psychological impacts of violent victimisation relies on the psychological residues carried by crime victims rather than physical evidence. Whilst not all victims of crime demonstrate long-term disabilities (Van der Kolk 1987; Ochberg 1988), each response to violent victimisation defines the onset of a new era in the victim's life (Rose et al. 1999; Russo & Roccato 2010). Kaufman (1997, p. 199) notes that violence is responsible for causing anxiety to the victim "[...] *initiating a series of primitive survival responses outside the range of normal experience*".

The emotional stress is typically manifested through posttraumatic stress disorder, PTSD (Resnick et al. 1993; Davis & Breslau 1994; Kaysen et al. 2011; Kunst, Winkel & Bogaerts 2011), depression and anxiety (Kilpatrick, Edmunds & Seymour 1992; Norris, Kaniasty & Thompson 1997; Choudhary, Smith & Bossarte 2012), anger (DeValve 2005; Hinduja & Patchin 2007) substance abuse and counter-phobic behaviour (Rothbaum et al. 1992; Yehuda & McFarlane 1995), lowered levels of well-being (Denkers & Winkel 1997; Denkers & Winkel 1998) and lower perceptions of health (Koss, Woodruff & Koss 1990; Koss, Koss & Woodruff 1991). Kilpatrick

et al. (1998), Kilpatrick and Acierno (2003) and Johansen et al. (2006) suggested that PTSD is the dominant response in victims of violent crime whereas the remainder symptoms capture emotional problems secondary to PTSD.

Literature identifies the multidimensionality in the consequences of victimisation, suggesting such an experience shapes the individuals' life course rather than a specific time interval (Macmillan 2000; Macmillan 2001). While the trauma of victimisation has been amply documented, indicating the severity of the physical and psychological trauma sustained by victims (Kilpatrick et al. 1985; Cook, Smith & Harrel 1987; Frieze, Hymer & Greenberg 1987; Burnam et al. 1998; Roberts & Green 2007), research has not yet identified any particular characteristics that can foretell its impact on the victims. This study remedies this first by assessing factors that could predict victimisation and then by distinguishing which of those that predicted greater emotional response in victims of violent crime. This research offer a new viewpoint in the study of the psychological trauma suggesting that the degree of affection can be attributed to a number of offence-specific and socio-economic characteristics. The findings are discussed in the following sections.

7.1.1 On victimisation

Following the evidence in the literature, this study hypothesised that a number of demographic, social and behavioural factors would relate to the likelihood of being a victim of violence. The results supported the initial hypothesis and corroborated with published evidence (Felson & Burchfield 2004; Brennan, Moore & Shepherd 2006; Brennan 2007; Bryant & Willis 2008; Brennan, Moore & Shepherd 2010), indicating that younger age, gender (being male), marital status (being separated/divorced), lower income ($\leq$ £14,999), lack of educational qualifications, poor health (self-rated) and alcohol consumption were significant predictors of victimisation. Younger age, being separated/divorced, lower income and poor perceived health were significant predictors of repeat victimisation, whereas respondents of higher income categories were more likely to be involved in repeat victimisation. This can be attributed to the fact that all types of victimisation were included in this assessment, including theft and property crime. Although literature suggests the relationship between crime and wealth is ambiguous

(Muroi & Baumann 2009), wealth has been occasionally reported as a risk factor (Andrienko 2002; Sagovsky & Johnson 2007) which explains the direction of the reported result. When the assessment was limited to include violent incidents of repeat victimisation only, analyses indicated that younger age, gender (being male), ethnicity (white background), being separated/divorced and poor self-rated health status were positive and significant predictors whereas being married and low income were negative and significant predictors. These results suggest that married respondents were less likely to be repeatedly victimised compared to their single counterparts and that respondents from wealthier household were more likely to this outcome compared to their less wealthy counterparts.

A number of studies have attempted to explain why younger people are more at risk for victimisation. The reported relationship has been attributed to risk taking (Finkelhor & Asdigian 1996), environmental (e.g. poor neighbourhood, school exclusion, see Hidelang, Gottfredson & Gaffalo 1978; Taylor et al. 2008; Tillyer et al. 2011) and personality traits (e.g. boredom, peer pressure, bullying, see Farrington 1996; Flood-Page et al. 2000), drug abuse and lack of social bonding (quality of relationships with positive role models, opportunities for involvement in the lives of families, schools and communities, see Farrington 1996; Adamson 2003; Schreck & Fisher 2004). However, Adamson (2003) emphasised that young people were as likely to be victims as perpetrators. Wood (2005, p. 1) reported that in the 2003 Crime and Justice Survey (C&JS) "*offending by young people was the factor most strongly associated with their being victims of personal crime*", whereas anti-social behaviour and being male were other significant risk factors.

Marital status and specifically being divorced/separated was a significant risk factor for victimisation in this study, finding that corroborates with published evidence which suggests a relationship between victimisation and family structure (Marcus & Swett 2002; Mouzos & Makkai 2004) with a single parent families being more at risk of threatened or physical violence than 'intact' ones (Kershaw et al. 2000; Snowball & Weatherburn 2008). This can be attributed to the cross-sectional nature of the BCS (Brennan, Moore & Shepherd 2010) or can be explained as a social stressor similar to events such as grief for loss of a beloved person, witness to violence, discrimination/racism that have been associated to violent victimisation (Snowball & Weatherburn 2008).

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Low household income has been systematically linked to victimisation risks (Pedersen 2001; Van Wilsem et al. 2006; Brennan, Moore & Shepherd 2006; Nicholas, Kershaw & Walker 2007; Brennan, Moore & Shepherd 2010). A variety of explanations has been suggested in support of this finding. Considering how income may describe lifestyle factors and social environment, it can be indirectly associated with vulnerability as lower income may create a public life-style profile, which leads to exposure in higher risk environments such as low-income housing developments, with higher violence rates and limited resources (Miethe & Meier 1994). According to this "*lifestyle-exposure*" perspective, developed by Hidelang, Gottfredson and Gaffalo (1978), younger, male, unmarried individuals with low income can be at higher risks of victimisation by being exposed to more risky situations, as for instance by using less time within the family environment and more time associating with individuals with criminal tendencies. Following a similar approach, Snowball and Weatherburn (2008) identified low income as another social stressor considering how it can lead to social exclusion, or, alternatively put to the inclusion to high-risk groups, more vulnerable to victimisation, based on the realistic difficulties imposed on the individual. The empirical evidence provided by Miethe and Meier (1994) and by Barslund et al. (2007) according to which people of lower socio-economic status that reside in less affluent areas and in close distance with groups of motivated offenders are at the greater risk of victimisation. BCS research offers further evidence in support of this finding, by systematically reporting deprived and transitional neighbourhoods among those with the higher victimisation rates (Stockdale, Whitehead & Rennie 2002; Camina 2004; Mathers, Parry & Jones 2008). Nonetheless, the relationship between crime and income cannot be explained by a single factor, due to the plethora of confounding effects to consider in such an assessment. As noted by Cohen, Kluegel and Land (1981), the effect of income on victimisation risks is probably more highly dependent on the nature of the crime.

This was further reinforced by the relationships reported with educational qualifications as poor educational attainment was found to be a significant victimisation predictors. Excluding developing countries, research suggests that education is linked to income (Montgomery et al. 2000) while indicates that there is a strong relationship between socioeconomic status (e.g. education, income, occupation) and health outcomes (Stewart & Simelane 2005). Income is commonly used as a proxy for education and vice versa, as "*a household's income summarizes its*

command over resources, including the resources that could promote health, lessen the need for high fertility, or reduce the opportunity costs of children's schooling" (Montgomery et al. 2000, p. 3). This explains the directionality of the results as even when income was found to be positively associated with the victimisation outcome, the lack of any educational qualifications maintained its negative sign throughout all the assessed models. However, the evidence in the literature remains inconclusive. Some authors support the role of education as a protective factor against victimisation (Soares 2004; MacMillan & Hagan 2004; Brennan, Moore & Shepherd 2006; Brennan, Moore & Shepherd 2010) whereas others argue that education can increase the victimisation risks (Gaviria & Pages 2002); *'the education effect'*: where rates increase with years of education (see Sparks 1981). Cumulatively, the majority of published material refers to identify lack of educational qualifications or lower educational level as a victimisation risk; yet the effects of education on victimisation risks vary, depending on the study and the country (Barslund et al. 2007).

Similarly was observed with (self-rated) health status, as in this study, self-perceived poor health was another factor that was significantly associated with the likelihood of victimisation. Despite this finding corroborates with previous evidence (Turner, Finkelhor & Ormrod 2007; Bryant & Willis 2008; Perreault 2009; D'Esposito, Blake & Riccio 2011), it should be noted that the cross-sectional nature of BCS may be a confounding factor in interpreting this result as the sample included responses from people that had already been victimised more than once. Hence, the analysis was not able to distinguish if the perceived health state was attributed to a previous assault or whether it actually predicted elevated victimisation risk. In addition, self rated health has been criticised as being a misleading measure of ill health, as self-perception may be influenced by other factors, such as social experiences of the subject (Sen 2002) or other environmental factors (Grubaugh et al. 2011; Subica, Claypoole & Wylie 2012). Published evidence on the aftermath of victimisation indicates that poor health is frequently observed in victims of crime (Sundaram et al. 2004) and in individuals with a history of (repeat) victimisation (Hiday et al. 2001; Brekke et al. 2001; Goodman et al. 2001). Especially mental health has been reported as a strong indicator of increased victimisation risk (Walsh et al. 2003; Chapple et al. 2004; Choe, Teplin & Abram 2008; Larney et al. 2009) with research suggesting that those reporting higher levels of depressive symptomatology were more likely to report past year victimisation (Wenzel, Koegel & Gelberg 2000).

While the significant risk factors were discussed separately, it should be noted that all items reflect the compounding impact of the risk of criminal victimisation. Snowball and Weatherburn (2008) argued that risk factors have cumulative effects; i.e. the more risk factors an individual is identified with, the more is the likelihood for the same individual to will experience victimisation. For example, a younger male who engages in high-risk alcohol consumption will be at greater risk of violent victimisation than a just a younger individual. In the same vein, research indicates that the risk of victimisation increases markedly as the number of identified predictors accumulates (Al-Yaman, Van Doeland & Wallis 2006; Bryant & Willis 2008). Further study is needed to determine whether there is a causal relationship in the factors discussed or simple associations that also relate to the commotion of other factors that are typically manifested in social (violent or non-violent) environments. Moreover, the retrospective nature of the BCS requires caution with the generalisation of the directionality observed with some of the risk indicators identified in this study (Brennan 2007)[80].

With regard to the robustness of the findings, the findings of this study corroborate wand confirm the evidence in the literature as indicated above. The findings in Bryant and Willis (2008) can further enhance the insight provided by this study, as they indicate that socio-demographic (age, sex, income), historical (previous contact with criminal justice system), individual, family, community (alcohol abuse, housing mobility) and resources (education, employment, location) are greater victimisation risk factors amongst young people (midteens to mid-twenties) and that the described risks decreased with age. To reflect the focus on victims of violence, inevitably the study had to limit its working sample to the corresponding BCS subsamples. Although this had an impact on the total amount of observations in each of the assessed models, the selection of subsamples was randomly made (ref). Thus it is reasonable to assume that the "missing" data would be independently distributed and therefore cannot undermine the generalisability of the models in the study. Any issues resulting from "missingness" in the data would constitute an acceptable influence (Nicholas et al. 2007) that would not undermine the robustness of the findings reported here. In addition, it was decided that the likely predictive importance of the variables in the victims form outweighed the

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[80] Given that the survey asks questions in response to crime, some of the variables may also be influenced as a response to crime, such as health and marital status, income, and alcohol consumption.

importance of likelihood of encountering such issues. The sample characteristics remained consistent despite the differences in the number of the employed observations, with one exception in the study of victimisation risks where the final model was run with a significantly younger sample. The age difference however was reflected in the results as it was indicated that younger people were consistently more likely to be victimised regardless of the employed sample. The repeat victimisation results indicated that the sample composition remained similar in the modelling exercise thus indicating that there none of the assessed characteristics particularly influenced the significance of the reported outcome. Considering that BCS is a nationally representative survey and that similar findings were previously reported in Brennan et al. (2005), these findings should be considered robust across different samples. In both victimisation and repeat victimisation, no difference was detected when the models were run for separately for gender groups.

7.1.2 On emotional distress

   Literature shows that victimisation is a stressor in victim's life and a number of studies suggest that specific characteristics of crime, such as sustained injuries and trauma severity, may induce a more intense emotional outcome. According to Rando (1993, in Green & Diaz 2007, p. 197) "*the degree of violence, suddenness, unexpectedness and randomness of the violent crime coupled with the anger of the victim*" are factors that signal severe psychological response, whereas Norris and Kaniastry (1991) reported that victims of violent crime in their sample demonstrated higher levels of emotional stress compared to the nonviolent ones. Green and Diaz (2007) found that type of crime, coping strategy and social support were significant predictors of emotional stress among crime victims, highlighting the need of including features describing both short-term and long-term impacts of victimisation when studying the emotional consequences of violent victimisation. Although situations prior to crime vary for each victim (Green & Diaz 2007) they have not yet been shown to account for individual differences in the effects of crime on victims (Norris & Kaniasty 1991). Literature also indicates that age, gender and ethnicity have been linked to victimisation risks (Loeber, Kalb & Huizinga 2001; Gabbidon & Greene 2009; Sivarajasingam et al. 2009) but not to emotional outcome. Norris, Kaniasty and Thompson (1997) found that the

type of victimisation (e.g. assault, rape) was associated to the individuals' vulnerability in physical, psychological and economical terms. Amstadter and Vernon (2008) compared the emotional responses (fear, anger, guilt, shame, sadness) resulting from various trauma types (sexual and physical assault, transportation accidents, illness and injury) to find that that emotional responding was higher for victims of sexual and physical assault.

What calls into question is whether the severity of the psychological outcome can be explained based on distinct characteristics. This research attempted to address this question by examining which characteristics acted as predictors of both victimisation and of greater emotional distress in victims of violent crime. The aim of the latter was to identify those characteristics of a violent crime that influence the psychological outcome and trigger the underlying emotions. Assuming that greater emotional reaction would yield higher scores of crime seriousness, the study sought to identify factors associated with higher ratings to investigate the characteristics that influence respondent's perception. The results indicated that seriousness scores varied significantly based on the extent of the emotional affect demonstrated by the respondent whereas the age and severity of the effect on the respondent (including emotional response, taking time off to recover and severity of fore employed) were significant indicators of higher ratings. The investigations continued in the same vein where all the offence-specific, socio-demographic and behavioural factors that were previously indentified were assessed as to their predicting ability regarding the severity of emotional stress in victims of violent crime.

Results indicated that primarily offence-specific (use of force, number of injuries) and socio-demographic (gender, income, marital status) factors increased the likelihood of observing emotional distress as a reaction to violent victimisation in victims of crime. Assuming that an increase in each of the outcome variables indicates elevated emotional distress, the severity of the incident (using violent force and increasing number of injuries) predicted a more severe emotional reaction. This result suggests that the effect on emotional reaction elevates when physical interaction between the victim and the perpetrator is involved. This is a novel finding as it not only confirms hypotheses on the effect of injury severity (Shepherd et al. 1987; Shepherd et al. 1990; Timoney et al. 1990; Shepherd & Rivara 1998; Perciaccante, Ochs & Dodson 1999; Smith et al. 2003; Shepherd & Sivarajasingam 2005) and the type of experienced trauma (Green

& Diaz 2007; Amstadter & Vernon 2008), it also provides new evidence to support the importance of the severity of the crime incident as a stimuli for greater emotional distress. The importance of this finding lies in its applicability in further victimisation research. Literature indicates that previous victimisation is a very strong predictor of further victimisation (Norris, Kaniasty & Thompson 1997; Outlaw, Ruback & Britt 2002; Weisel 2005; Finkelhor, Ormrod & Turner 2007), whereas it most likely affects the victim's reaction to new victimisation (Messman & Long 1996; Byrne et al. 1999; Nishith, Mechanic & Resick 2000). Brunet et al. (2001) found that victim's bad reaction to previous trauma is likely to be repeated in case of a new trauma.

The effect of education and income was also significant, with the first suggesting that respondents with educational qualifications were less likely to demonstrate severe emotional stress and the latter that being educated and financially wealthy played a mediating role in victims' emotional reaction. Regarding financial wealth, this can be explained based on the variety of coping options a wealthier victim may have compared to less wealthy individuals. Research has shown that coping mechanisms (e.g. social support, private consultation) have been statistically significant predictors of inverse relationship with emotional stress (Green & Pomeroy 2007; Green & Diaz 2007). This is also concordant with theoretical grounds of providing victim support, as it assists in attenuating victim's emotional reaction to the victimisation event and helps with the coping process (Billings & Moos 1981; Sandler & Barrera 1984). Similarly, being educated may act as a buffer against the effects of stress or, alternately, has a direct positive effect on the individual's overall functioning with such an adverse situation.

The assessment of the relationship between gender and the emotional outcome indicated significant gender differences in the demonstrated levels of emotional responding to victimisation. More specifically, females were more likely to be emotionally affected, in support of the studies on stress reactions to violence (Andrews, Brewin & Rose 2003; Rizvi et al. 2008; Campbell, Dworkin & Cabral 2009). Similar was observed with self-rated poor health, suggesting that this was a significant predictor of emotional distress; not surprising assuming that an

individual with poor health would be more susceptible and less prepared to cope with the adverse consequences of victimisation compared to a healthier individual.[81]

Alcohol was also found to play a mediating role in the emotional responding suggesting that consuming alcohol prior to the victimisation incident acted as a protective factor against this outcome. Alcohol has been consistently linked with violence and criminal behaviour and comprises a commonly reported risk factor associated with victimisation (Shepherd, Robinson & Levers 1990; Welte & Wieczorek 1998; Markowitz 2005; Shepherd, Sutherland & Newcombe 2006; Brennan, Moore & Shepherd 2010). Although the aetiology of such a finding is complex and the finding itself is an oxymoron, possible explanations may involve the pharmacological effects of alcohol on brain function, the affects of alcohol on emotion through cognition and features of victimisation, such as repeat victimisation and resulting numbness (Litz & Gray 2002). Research suggests that alcohol affects behaviour through its pharmacological effects on cognitive processing (Bartholow et al. 2012), whereas it has been shown that alcohol depresses nerve cells impairing brain function (Oscar-Berman & Marinkoviж 2007). It progressively affects brain regions that control inhibitions, influencing expression of feelings, perception of senses and physiology of the intoxicated subject (Goodlett & Horn 2001). Consequently, memory, concentration, coordination and generally abilities to react become impaired (Hernández & Vogel-Sprott 2010; van Ravenzwaaij, Dutilh & Wagenmakers 2012). Hence, considering that emotional reactions are part of cognitive functioning, the reported effect on emotional responding among those intoxicated can be attributed to the described impairment in cognitive functioning (Bartholow et al. 2003; Field, Schoenmakers & Wiers 2008; Hernández & Vogel-Sprott 2010).

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[81] It should be noted though that the BCS does not distinguish whether the reported poor health could reflect an outcome of previous victimisation experience.

7.2 Studying stated preferences: valuation findings and implications

The aim of the valuation exercise was to investigate the intangible values of assault-related injuries with reference to their severity and psychological outcome under the SP framework. The WTP values were found to be consistent with the stated preferences across the provided scenarios and the elicited values changed depending on the scenario descriptors; i.e. the severity of the outcomes and on the incorporated risk reduction. The concluding remarks of this estimation exercise are summarised below.

First, notable is the difference in the non-parametric and parametric estimation of WTP values, with the latter producing greater WTP mean estimates and thus corroborating with the evidence in the literature regarding the conservativeness of non-parametric estimates[82]. Second, the WTP values were not found to be kept consistently high for any of the scenarios with one exception; that is Scenario B describing severe head injuries and significant psychological harm. This indicates that WTP is higher for avoiding severe head-related injuries. However, there was not enough evidence to support that overall the elicited WTP measures were sensitive to the location of injury. On the other hand, it was shown that the WTP values were greatly influenced by the severity of injury and that the level of the values was determined based on the risk reduction described each time. Furthermore, the WTP estimates were found to be consistent across injury types as the rank order of monetary values assigned to each of the Scenarios was consistent with the respondents' ranked stated preferences. Hence, the third main outcome refers to the level of WTP bids, which notably differentiated on the basis of the severity and the risk reduction described in each scenario, with severe head injury leading the valuations and the corresponding profile being the most prevalent undesired outcome. However, the lack of a universal baseline risk does not justify any assumptions on potential agreement between stated ranking of outcomes and rank ordering of WTP, as that would depend on the specified baseline risk. Fourth, results indicated that all WTA values greatly exceeded their corresponding WTP, which was concordant with prior expectations verifying the initial hypothesis that WTP will provide the more parsimonious method to quantifying the intangible costs of violence. Fifth, another interesting result is the high values of standard deviation observed for each of the

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[82] Finding that is consistent with prior expectations, as the non-parametric approach is not affected by any distributional assumptions.

elicited values. The standard deviation of the calculated values captured the extent of the variation in the stated valuations, hence showing how differently the concept of valuation is perceived among the respondents. Finally, the last significant observation refers to the large disparity observed between mean and median WTP values, with the median being significantly smaller than the mean in all cases. This reveals that mean WTP values are skewed and largely driven by a relatively small number of individuals with high WTP. Thus, the median produces a much more conservative measure of value.

If any comparison is feasible with findings from other studies that used WTP to produce intangible estimations, then the results reported here compare relatively well with those reported in the relevant literature (see Table 2:1, Chapter 2). However, only the study by Atkinson, Healey and Mourato (2005) can be used for a direct comparison as their injury descriptors were similar to those reported here. The values reported in Cohen et al. (2004) and in Bishop and Murphy (2011) compare well with the mean annual WTP for the prevention programme that promised a 10% crime reduction in respondent's community (£161 from the parametric and £80 from the non-parametric estimation; see Tables 2:1 and 6.5). It should be noted though that Bishop and Murphy (2011) valued WTP for increase, whereas the present study valued WTP for reduction; thus the comparison of their estimated with those presented here can be questioned, given that object under valuation is different[83].

The intangible costs reported in Brand and Price (2000) and Mayhew (2003) exceed the WTP valuations presented here but compare better to the compensatory notions obtained for the scenarios equivalent to Other and Serious Wounding (see Tables 2:1 and 6.5). That is especially for the 'all VAP excluding homicide' category in Brand and Price (2000) and the more serious injury categories in Mayhew (2003), as they fall in the same range with those presented in this study (see Tables 2:1 and 6.5). This study's valuations are also comparable with those deriving from QALY methodologies. Assuming that scenarios A, C and E describe victimisation consequences similar to those in other wounding (see Table 2:1), this study reported that for those scenarios the non-parametric mean WTP ranged from £74.948 to £383.971 and the

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[83] More specifically, Bishop and Murphy (2011) elicited their WTP estimates by employing a dynamic approach to estimate a hedonic model. When they compared their estimates from the dynamic model with those obtained under the traditional myopic version of the model, they found that latter underestimates WTP by 21%; i.e. suffers from a 21% downward bias.

parametric from £81 to £538; values considerably lower than their QALY equivalent reported in Dolan et al. (2005). Similar outcome is observed if the Dolan et al. (2005) estimates £5,723 (NICE) and £15,378 for serious wounding are compared with the mean WTP for scenarios B, D and F which ranged from £226 to £1,039 (non-parametric) and from £319 to £1,662 (parametric). On the other hand, the QALY equivalents compare better with the WTA results and all types of compensatory notions as elicited from the survey. For instance, this study found that for Other Wounding the reported amounts ranged from £951 to £3,744 (including WTA and victim's compensatory amounts; see Tables 6:5-6) whereas for serious wounding the estimates ranged from £7,171 to £18,859.

   The pioneering work by Cohen (1988; 1990) offered another alternative with respect to victim's intangible costs using jury awards to approximate society's assessment of the pain and suffering. Similar work has not yet been done for the UK although Criminal Injury Compensation (CIC) awards are currently being used to compensate for a number of injuries (approximately 400 specified norms) where the compensatory amounts range from £1,000 to £250,000 as set by the Parliament (Home office 2001). Such awards are intended as '*an expression of society's concern for and sympathy with the victim*' (Miers 1997, p. 192; quoted from Dolan et al. 2005, p. 961). On the basis of the 2008 CIC Scheme[84], there are 25 levels of compensation starting from £1,000 up to £250,000 (Level 25). A crude equivalent for the injuries described in the scenarios of this study fall within the first ten levels, where the compensation of each case of severe serious wounding found within these levels would be given a mean value of somewhere in the region of £10,000-£20,000, and a median value of about £3,000. For example, Scenario A described minor injuries to face and head (slight scratching, bruising/black eye, other superficial injuries) and moderate psychological damage, which according to the 2008 CIC Scheme is awarded £1,000 for minor multiple injuries (Level 1) and individually for head and face scarring £1,500 for each minor visible disfigurement. For more severe injuries such as those described in Scenario B the awards vary from £3,300 to £11,000 and the figure may rise depending on where the injury was observed (e.g. mouth, ears, eyes, teeth etc.) or whether operation was required. Although the characteristics of the study do not allow for such direct comparisons, there is

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[84] http://www.justice.gov.uk/downloads/victims-and-witnesses/cic-a/am-i-eligible/Criminal-Injuries-Compensation-Scheme-2008.pdf

evidence in the reported figures to support that the monetary metrics reported here can be regarded as a valid representation of losses and that they outline an alternative way of reaching a price for intangible costs without using the WTP methodology.

A final observation regarding the valuation exercise pertained to the differences between the figures of WTA and the victim's compensatory amount as suggested by the respondents. It has been purported in the literature that compensation and WTA refer to the same concept (Bateman et al. 2002). This study evidenced the difference between the notions of WTP and compensation by finding a numerical difference between the values retrieved for these metrics. Despite this evidence can not be regarded as a proof per se, it provides an indicator of an excising difference that should be further examined in the future. It should be mentioned though that WTA in this study was elicited by asking the individual to state his/her value while the question on compensation assumed that the victim would be other than the respondent. Whether this is the origin of the observed variation between these two metric or some other unidentified source remains open to discussion.

In this research, the factors that were influential on the elicited values conformed prior expectations and were similar to those reported in the related literature. Specifically, this study found that gender, low education, previous victimisation, poor health and difficulty in answering the questionnaire maintained a negative relationship with WTP. Literature indicates that low education in general has a negative effect on WTP, or, alternatively put, people with higher education tend to provide higher WTP valuations regardless of the 'good' being valued (Atkinson, Healey & Mourato 2005; Donfouet et al. 2011; Jarahi, Karbakhsh & Rashidian 2011). One explanation for this WTP externality is that respondents with higher education are more supportive to interventions aiming to reduce crime or that they feel as being more likely to benefit from a fall in crime compared to their less educated counterpart. A more general approach would link this result to income as the latter is typically found to have a positive effect on WTP (Cook & Ludwig 2000; Ready, Malzubris & Senkane 2002; Horowitz & McConnell 2003; Hokby & Soderqvist 2003; Atkinson, Healey & Mourato 2005; Alberini, Hunt & Markandya 2006; Broberg 2010). Assuming that higher education typically yields higher income (Blomquist et al. 2009) it is expected that those reporting higher WTP will be those with higher

income and by extent from those with higher educational attainment. However, the income effect in this study was not consistent[85] as although (higher) income was negatively associated with the probability of support (provision of positive WTP value), it constituted a significantly positive influence if support was provided. The inconsistency in the signs of the coefficients could be translated as a type of initial hesitation observed in respondents of higher income levels pertaining to their decision of paying or not paying for victimisation risk reduction. Whether this finding provides evidence against prior expectations supported by the CV literature contradicting the positive effect initially reported or whether it arises because of the characteristics of the sample used in this study is open to discussion.

A number of studies have examined the impact of health status on WTP. There are no definite theoretical predictions for health status yet (Johansson 2002; Hammit 2007; Andersson et al. 2011) but good health has commonly been reported as a positive WTP determinant especially for mental health (Krupnick et al. 2002). To obtain self-reported health status this study opted for a standardised measure of health status (EQ-5D-5L) to ensure the quality of the obtained responses and to substantiate their validity. Using the obtained health indicators to assess their effect on WTP, the study found that poor health indeed acted as a negative influence on WTP, both in terms of deciding to provide a positive WTP value and on the level of the stated amount. However, no significant association was detected result also consistent with other empirical evidence in the CVM literature (Alberini et al. 2004; Alberini, Hunt & Markandya 2006; Krupnick 2007; Andersson 2007). The negative association suggest that less healthy individuals tend to underestimate either the risks involved or their immediate benefit from any victimisation related risk reduction. Similar effect was reported with the variable denoting alcohol misuse. Intuitively, poor health status and potential alcohol misuse should be negatively related to WTP. However, this was the case only for the level of WTP as the probability of stating positive WTP value appeared to be positively influenced by alcohol misuse. Given though the lack of statistical significance in this finding, no further conclusions can be made thereon.

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[85] Income was reportedly positive in the OLS model but negative in the logistic model.

This study developed no prior assumptions for gender and age, as literature is not conclusive on the effect of these variables and found that being male had a negative effect on WTP. This finding suggests that females were not only more likely to provide positive valuations but also that they were more likely to provide higher valuations compared their male counterparts. Age was also negatively linked with the probability of providing positive values but to have a positive effect on the level of WTP. This was an effect similar to what was observed with income, as older people were seemingly more inclined to provide zero valuations but the positive valuations obtained by those were higher compared to the values obtained by younger members in the sample. One explanation for this inconsistency in the signs of the coefficients can be attributed to the small number of older respondents in the sample as according to the literature larger samples with a higher fraction of older people are reportedly significantly associated with finding this effect (Krupnick 2007). Hence, a larger study explicitly aimed at tackling this issue will be germane.

As a general remark, the effect of age and gender in WTP corroborate with those reported in the literature, as both types of effect have been reported (Alberini et al. 2004; Atkinson, Healey & Mourato 2005; Alberini, Hunt & Markandya 2006). One interpretation of the lower support among older respondents pertains to FoC perception in different age groups. FoC and fear of victimisation are concepts that have been used interchangeably in the literature as denoting the same effect for people of older age. A relevant phenomenon is the co-called Fear of Victimisation Paradox, also known as the Fear of Crime Paradox, which refers to the disproportional high fear of victimisation (crime) among women and elderly people (LaGrange, Ferraro & Supancic 1992; Skogan 1993; Schaut 2006; Jackson 2009). A common finding among FoC studies is that older adults report higher scores of FoC compared to younger adults, despite being less likely to be victims of crime (Ziegler & Mitchell 2003). However, the victimisation-fear paradox has been questioned. There is contradicting evidence to suggest that older people have diminished FoC compared to their younger counterparts as they feel that they are at lower risk in becoming victims of crime and consequently feel less intimidated by crime (Ferraro & LaGrange 1992; Moore & Shepherd 2007; Wyne 2008).

In the same vein and concordant with findings in the literature (Atkinson, Healey & Mourato 2005; Roman 2009; Cohen & Bowles 2010), this research reported that FoC was a positive influence on WTP; that is FoC not only positively influenced the decision on providing a positive valuation but also effectively contributed on the WTP amount. FoC refers to the public's perception of victimisation risk against its actual probability (Hale 1996; Farrall, Jackson & Gray 2007) and constitutes one of the major issues in the crime literature. FoC in valuation exercises is typically captured by expenditures in anticipation of crime; i.e. money spent to reduce victimisation risks such as defensive equipment or to mediate the consequences such as insurance administration. People recognise the possibility of being victimised and take measures to reduce that risk, either precautionary or defensive. Consequently, elevated FoC leads to elevated costs for the individual and is hence expected for those with prominent FoC to contribute more. On the other hand, previous victimisation in this study had a significant negative influence on the probability of stating positive WTP but a non-significant negative association with the WTP amount. It was assumed that previous victimisation would follow the same pattern with FoC, as victimisation not only undermines people's quality of life but also make them more afraid of crime (Russo & Roccato 2010) and for this reason, victims of crime would presumably contribute more to avoid a repetition of the experience.

One interpretation for this interesting emerged from the relevant literature. Controlling for individuals' FoC, Winkel et al. (2003) found no differences in fear levels between people who had been victimised and those who had not, which in this context partially explains the lack of statistical significance but it questions the validity of the initial assumption that FoC and prior victimisation experience would have the same effect on WTP. Acknowledging the potential of an erroneous initial speculation, other explanations should also be explored. For example, the reported negative association is consistent with the neutralisation technique perspective (Agnew 1985) according to which people tend to cope with the negative effects of victimisation, trying to neutralise them. In effect, the reported negative association can thereby translate as a mode of "protest" either against the experience per se (in an effort to neutralise its importance) or against the "equalisation" of the experience with money. An alternative interpretation pertains to the actual consequences of victimisation. It can be argued that victims of crime may habituate or feel less threatened by a victimisation scenario given that they have already experienced something

similar hence overcoming the initial fear of what such an experience would entail. Comments from the survey helped in formulating these speculations as quoted below:

"*[...] I have been physically assaulted numerous times [...] I was compensated £2,900 but the person was never caught despite the numerous CCTV camera in the area. I would never have paid anything to avoid it despite the fact it was a traumatic and painful event as it did somewhat benefit me and made me realise how vulnerable we all are [...]*" (male, victim, 38); "*Speaking as somebody who has been on the receiving end of violence [...] I cannot reasonably match physical violence against an abstract concept like money*" (female, victim, 26).

Another interpretation could involve victims own experience, as those that identified themselves as victims were not asked any details on the situation but on the situation's characteristics, such as injuries, medical care etc. The protest mentioned above may well refer to cases where violence started from a fight and escalated to assault, a typical phenomenon in Cardiff nightlife (Moore S, personal communication). Given the characteristics of the sample, it was expected that most of the victimisation events captured by the survey would associate with alcohol and nightlife economy and would follow a similar victimisation pattern. Consequently, the negative association of previous victimisation and WTP could reflect the objection of those that identified themselves as victims and were involuntary involved in a violent incident against the actual perpetrator who could also be identified as victim. This can be further elucidated through some of the comments obtained by the survey quoted below:

"*Those responsible should always pay regardless of me making a claim or not. Speaking for myself I would never pay a penny to compensate someone who thought fighting and drinking is fun*" (female, victim, 24); "*[...] I always think of the scenario, was it a fight or an attack*" (male, victim, 30); "*[...] although compensation for victims sounds good it somehow feels like paying someone for behaving badly*" (male, 21, victim); "*[...] payment is not the correct response for physical or moral infringement*" (female, 29, victim)

Although these comments were obtained on the question regarding victims' compensation, they reveal some of the motivation underlying the stated valuations. In this light, it may be hypothesised that protesting in CV valuations may reflect a previously unobserved response to the experience of victimisation, not so severe to affect the judgment of risks but still severe enough to affect their stated valuation. Although this may reflect respondents' objection to the

concept of willingness to pay, future research explicitly aimed at testing this hypothesis will be more accurate in addressing this issue.

The small number of victims in the sample and the possibility of self-selection bias should also be considered in the possible explanations. A higher volume of victims would probably provide a more reliable result as the small number of victims in the sample could possibly distort the interpretation of the effect of victimisation on WTP. Regarding the self-selection bias, this could be claimed by acknowledging that victims who agreed to answer such a questionnaire about violence would be people who could effectively cope with it. In addition, there was no way of practically reporting the actual attempts of filling up the survey and the point (question) where that effort was aborted. The observations above indicate that the results hereby reported should not be generalised to the general population but instead used to generate new hypotheses and questions for further research. Alternatively, this could be explained by assuming that the respondent's WTP values did not reflect personal motivations such as perceived risk and previous experiences but were based on other, unobserved characteristics, thus emphasising the importance of other WTP determinants (see Atkinson, Healey & Mourato 2005). Again, it might be either that the survey failed to capture those characteristics, or that the size of the sample was not sufficient to demonstrate the importance of the remaining characteristics of the respondents that were not included in the modelling exercise.

7.3 Contribution

This research contributes to the literature on crime costs, as it developed previous knowledge to produce findings comparable to published evidence. The present study contributes with three main elements to the existing literature.

First, this research identified a two-dimensional structure underlying emotional reaction to a victimisation event, contingent on the severity of interaction between the victim and the perpetrator. A similar structure was revealed in the characteristics of injury in victims of assault. These findings were used to construct an evidence-based description of short scenarios describing the expected aftermath of a violent assault in a way meaningful to the general

population. The descriptors not only developed a new classification in the context of violent offending that had not been analysed in previous studies, but also corresponded to the crime typology suggested by the UK Home Office. The novelty in the descriptors lies in the fact that they focused on interpreting the victimisation situations exclusively in terms of victim values that this research identified. In addition, this research proposed a new metric for injury severity; that of arrival by ambulance. Although more strenuous research is required to validate this proposal, such a metric has never been tested before for this purpose and in this research it showed promising results.

From a methodological point of view, future studies could benefit greatly from this research, especially if some of the measures hereby suggested that could be used in larger scale studies. This research is -to the author's knowledge- the first contingent valuation application in the context of crime in the UK that employed (i) newly developed scenarios based on epidemiological research, (ii) the open-ended method for value elicitation, (iii) a full scale validation procedures and (iv) a web-based structure for the survey communication and comprises the second CV application in the context of crime in the UK. This thesis offered a detailed description of the procedures required to validate a CV survey instrument and was the first to use verbal-protocols for this purpose. The use of a variety of survey modes for validating a survey instrument has not yet been recorded and the research clearly described the benefits for employing such measures before commencing a CV survey. This research can be regarded as a manual for future similar applications, as it illustrates every step that should be taken towards completing a valuation exercise and offered a data analysis mode that could be further used and enhanced to aid more complex applications of this technique.

The novelty also relied on the design of this research as not only the scenario descriptors used to construct the CV scenarios were novel and based on research hereby described, but also the questions asked, although based on a specific typology, they were new and did not reproduce previous findings. Questions in the developed survey instrument and the research presented in this thesis focused at shedding light to those crime characteristics that have signalled a serious emotional reaction. The basis of the question's context did not solely rely on the existing typology but moved a step forward, building a new classification on its own. Hence, the

implemented research was grounded in previously acclaimed knowledge, while it built upon new evidence. Notably, the survey questions did not solely rely in individuals measurements (such as WTP to protect one's self), but also address community risks (WTP for prevention programmes). It is the first time that this has been implemented in the UK context, as research so far has not yet fully addressed this issue using the same sample.

In terms of general contribution, this research aimed at bridging some of the available knowledge on the values that public places on victimisation risk reductions and extend the findings of previous studies measuring WTP for such reductions using similar techniques. The valuations presented in this research demonstrated the suitability of the stated preferences techniques (especially that of CV) in valuing the psychological effects of crime, hence opening the way for further such application in this context. Moreover, the epidemiological finding presented in this research can benefit violence and injury prevention organisations in directing future research and interventions that target violent crime reduction in the UK. Policy makers have now more aids available in assessing the cost-effectiveness of policies that aim at reducing crime risks as this research offered hard evidence concerning intangible injury outcomes in contrast to the existing descriptive evidence. The experimental aspects of this research add to the existing knowledge concerning the emotional costs of crime whereas the research gives the opportunity in further examining the potential experimental factors that influence the elicited intangible estimates.

In all, understanding violence costs is essential to determine the cost effectiveness of programs and interventions that reduce the incidence of violence, track progress in violent crime costs over time, help in identifying geographic 'hot spots' and compare 'violent crime' to other social ills. A general understanding of the processes involved in the elicitation of the intangible costs is important in beginning to investigate the victim from an experimental position.

7.4 Limitations

Before commissioning the study, the limitations of the available time and recourses had to be considered. Given that the study aimed towards a PhD qualification, the available time for developing and conducting the online survey was eleven months, excluding the data analysis and the reporting of the findings. According to Bateman et al. (2002) SP studies can take up to a year depending on the complexity of the resource, the nature of the potential changes and the time required for assessing the environmental impacts. However, this time plan applies when the research team comprises a team of experienced scientists, including econometric experts and economics consultants. In this case, the available resources in economics were limited to the published literature and the works had to be done by one researcher only. Another limitation was the cost of the implementation. Typically, SP studies can be quite costly[86] given the large sample size required and the survey format. Bearing in mind that size of budget is only an indicator of quality and not a guarantee, careful consideration was done in the available options for the development of the survey.

The use of two different data sources employed for conducting the secondary analysis of the thesis (see Chapter 4) implied a number of limitations. Two of these pertained to the use of BCS data and three to the use of A&E data, with data limitations (missing information, coding problems and errors) being a common denominator in both.

Regarding the first, BCS is a complex study with data organised at different levels (households, individuals and incidents) that counts several sub-samples that contain a particular type of questions. Consequently, in using such data for exploratory purposes requires caution in interpretation as, similar to any other large-scale sample survey, resulting estimates are always subject to sampling error and methodological limitations. Thus, data problems may have affected the reported findings as a number of issues on the data were considered in treating the corresponding variables. The analyses reported in this thesis excluded responses coded as refusals or missing data, which in some occasions significantly reduced the sample size of specific variables and could subsequently affect statistical significance. Similar issue emerged

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[86] Costs typically range between £50,000 and £200,000; however in the US over a million pounds have been spent for such projects. See Section 2.2.3. (p. 69) in Bateman et al. (2002).

with the use of sub-samples, as the significantly lower number of observations included drastically effects the results reflected by the modelling exercises reported in this thesis. Although the readily weighted data offer the advantage of statistical power when the full BCS sample is employed[87] , they penalise further analyses by mediating the focus to the individual.[88]

The cross-sectional nature of the BCS (respondent's perception on crime, the recall factor) is another limitation as cause and effect cannot be definitively assigned. BCS asks detailed information on respondents' crime experiences during the 12 months preceding the survey, thus the accuracy of BCS recording depends on respondents' ability to recall accurately their experiences in the reference period. This also applies to the perception of the as to its importance as the recalling process may reveal significant victimisation events and hinder other incidents, minor yet legal offences. This would be a source of bias as it would over-report severe victimisation events and underreport minor incidents and some forms of violence. Aside from the recall factor, the cross sectional nature of the survey could be a confounding factor, as in some occasions, for instance with socio-economic and demographic indicators (e.g. marital and health status), it was not able to establish whether the recorded responses could be attributed to a victimisation event or not.

In review of the limitations pertaining to the use of A&E data, the recording inaccuracies, the lack of validated severity measures and the issues in the generalisability of the findings were the main barriers identified in this research. The limited amount information on the circumstances surrounding an A&E attendance[89] coupled with the fact that the majority of the attendances are typically recorded as Other Accident or Other Non-accident further add to these issues (Downing & Wilson 2004). Similarly to what was noted with the BCS data, ED records comprise large-scale datasets that, suffer from response and recording errors in conjunction with the deliberate omissions by the respondents (here the patients). Given that A&E data are collected for non-research purposes, the failure to obtain a full set of responses (later coded as

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[87] That is the Non-Victim Form and Victim Form data only.
[88] A comprehensive review of the BCS methodological drawbacks regarding sampling errors, deliberate omissions, sampling and response errors can be found at the 2008/09 BCS Technical Report I (Bolling, Grant & Donovan 2009).
[89] The patient group field consists of seven categories: Road Traffic Accident, Assault, Deliberate Self-harm, Sports Injury, Firework Injury, Other Accident, Other Non accident (Downing & Wilson 2004).

"missing data") may not be a significant omission for the ED personnel responsible for the recording of such data, but is vital for all survey analyses (Brennan 2007). The misinterpretation, inaccuracy or inconsistency in the recorded responses may also add to this problem especially to those cases where the patient is intoxicated (D'Argembeau et al. 2006) or tries to protect himself or their assailants from punishment in case of illicit activities (Ergin et al. 2005). Furthermore, ED data may misrepresent the fatality rates or number of inflicted injuries, as although all injuries may be recorded at the time of registration, these are dropped before the data leaves the NHS analyst and only the most serious one remains coded.

Another limitation in the A&E data is the lack of pain indicators other that the triaging score which is primarily used for assessing the urgency and not the severity of an incident (also see Downing & Wilson 2004). The issue it that urgency does not always accurately reflect injury severity and does not mirror the patient's pain mainly because triaging is an "*assessment of not only the physiology and anatomy of the injury but also of the mechanism of the injury and special patient and system considerations*" (Sasser et al. 2012, p. 2). Despite the usefulness of triaging scores in objective evaluations and in the assessment of incidence of certain conditions, it does not account for the individual's suffering and thus provides nothing from an anthropocentric point of view.

Regarding the generalisability of the findings, a factor to consider is the ED accessibility in terms of distance. It has been shown that the greater the distance between residence and ED, the less likely is the visit to the nearest ED for injury treatment (Lyons et al. 1995). This implies that the ED figures on violent injury may underreport the true incidence of violent injury due to the distance between the patient and the ED. A number of violent crime victims, despite their injuries, may not seek treatment for their injury in their nearest ED because they underestimate the importance of the sustained injuries or cannot justify travelling that distance for such a purpose. On the other hand, this suggests that A&E data over-report the rates on serious injury as rationally, the more severe the injuries are the more likely it is that the patient will seek treatment. Furthermore, Lyons et al. (1995) and Downing and Wilson (2004) argued that the patient's registration information cannot reflect accurately the distance patients travelled to reach A&E. Therefore, accessibility to the EDs is a critical issue that necessitate further exploration before any generalisation of specific findings.

Moving on to the experimental aspects of this research, one of the general issues was the identification of the lack of appropriate numerical validation procedures suitable for CV experiments. To address this issue, a combination of validation techniques were used and implemented in several stages each targeting a different aspect of questionnaire. This solution though did not come without problems. The first issue that was considered was that of defining the sampling design. The sampling design intrinsically interrelates with the choice of survey mode, which in return dictates the sampling techniques, sample size, the cost and the settings for the data collection. The first was one of the issues highlighted during the developmental process of this thesis as only non-probability sampling could be achieved given the means available for conducting this research. This implied that no selection criteria were applied to the participants other than their convenient accessibility and proximity to the researcher, which inadvertently excludes a great proportion of the general population. However, this does not necessarily undermine the battery work as it provides rich qualitative information and offers quantitative trends without the complications of a randomised sample. In addition, getting representative numerical results was not a research objective in any of the stages described in this research due to the restrictions imposed by the context in which this work was conducted. However, every effort was made to compensate for this limitation by focusing on documenting and enhancing the quality of the research materials, in both the experimental stages and the main data collection, through the collection of illustrative quotes and rich verbatim comments, while providing detailed demographic profiles to support and explain them. It should be noted though that the final determination of the sampling design was made based on logistical practicalities.

A similarly challenging issue was posed by the calculation of the sample size. That is, because all the potential tradeoffs that can be involved when deciding on the sampling approach and the survey mode culminate in its determination (Bateman et al. 2002)[90]. In this research, the sample size calculation was based on a simple random sampling approach under the framework outlined by Mitchell and Carson (1989) and Bateman et al. (2002), and it was parsimoniously estimated to 250 complete and valid responses. In terms of the target population, when the population holds

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[90] According to Bateman et al. (2002) three principal considerations should direct the sample size calculations: (1) the smallest subgroup within the sample for which estimates are needed, (2) the amount of sampling error that can be tolerated and (3) the observed variation in the target population with respect to the characteristic of interest.

NUVs there is currently no clear consensus in the literature regarding its determination[91]. Hence, following geographical sampling, the target population was identified to be that of general Cardiff residents.

The mode that the survey is communicated constitutes another significant part of a study's cost. The most efficient way for collecting such a number of responses in the available time was deemed to be an on-line questionnaire. The best alternative would be face-to-face interviews, but this option was discarded due to the time, the cost, the difficulty in approaching the sample and the extra personnel this would require. Similar limitations would be implied if mail or telephone survey mode was adopted. Although internet based surveys may preclude the random sampling approach, choosing the survey mode was a balancing of feasibility versus precision. Another reason for opting for the technique was the lack of options in the available methodologies for efficiently calculating a sample size that is not based on a probabilistic design. The review of the CV literature did not help in that direction as the amount of information regarding the development each project was restricted to a simple reporting of the survey mode, method and sample size without any justification for these choices. It was assumed that a sufficiently large amount of required responses would compensate the loss in precision. In addition, the sampling error mostly concerns projects executed for litigation or implementation of governmental policies purposes. In this case, where the aim is to provide information on the individuals' perception of risk, since the perceptions would not be informed by any notion of objective risk in a specific fragment of the population, the extent to which those perceptions should be integrated into the sampling methodology is open to discussion.

Compromises though are inevitable in studies of this nature. Then again, the majority of the credibility issues pertain to the context of the study; and in this research high standards were set to balance for the unavoidable issues in the sampling design. The systematic analytical strategy adopted in all the stages involved in this research should ascertain its credibility and compensate for the omissions that regrettably but knowingly had to be made.

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[91] It is typical to assume that if NUVs exist, there will be no discrimination in determining user and non-user population.

7.5 Suggestions for further research

This thesis used the stated preference technique for eliciting and studying costs of violence and victimisation risks with a special focus on the intangible consequences of victimisation. There is no universally accepted approach in pricing such cost although they are actively considered in policies and interventions that target crime reduction:

"*It is an inescapable fact that, in a resource-constrained public policy environment, decision-makers already place implicit valuations on crime and its impact on victims via the relative public spending priorities that are given to different policies that target criminal offending.*" (Atkinson, Healey & Mourato 2005, p. 580)

While the authors argue on the representativeness of the valuations (due to the assumptions made during an SP experiment) even when the task is completed under *'best practice'* conditions (Loomes 2007, p. 248), the methodology per se offers a valuable insight in otherwise unobservable costs. Any larger scale application of this project would not only address the limitations of this study but would provide useful reference values that would be nationally representative and thus could be used in cost benefit exercises. Moreover, a comprehensive calculation of intangible costs is required not only for direct comparison of costs and benefits but also for achieving more coherent resource allocation. Nonetheless, any similar approach will always entail economic assumptions (e.g. QALY, VSL). An alternative way of studying intangible costs of crime would be through a systematic longitudinal study that will survey victims of crime and will record all costs incurred after the incident of crime. In-depth interviews of the victims and other members of their household will provide a more consistent view of what is now solely approximated. If such data can be readily obtained, retrospective studies in violence-incurred costs will also be germane.

Further research should also focus on assessing whether the experience of crime influences the monetary valuations and if so, under what circumstances. As little to no evidence exists on this topic from a UK perspective, the findings from such a project will significantly contribute to the research in intangible crime cost. Regardless of the valuation technique, such a project would survey victims of crime only, using more qualitative methodologies than the research in this thesis (e.g. interviews, focus groups) aiming to produce an estimation of how victims value their experience and the risks involved, to detect patterns in the obtained responses and to identify

factors that influence the stated values. The comparison of the results with those outlined in this research would be of great value and would have a detrimental effect in the future design of policies while the findings could be used to inform crime reduction initiatives.

Constructive research may also offer a number of techniques that could be of potential value in studying costs of crime and violence. For example, the Agent-Based Modelling (ABM) is one of the theoretical and methodological tools available for understanding analysing the behaviour of individuals and populations in social and evolutionary settings. ABM is a simulation modelling technique for complex systems (e.g. social networks/systems) that uses a diverse set of autonomous and heterogeneous decision-making entities called agents (e.g. people, groups, organisations) to describe (i.e. model) the system of interest (Bonabeau 2002). Behavioural rules are applied to the agents according to the system they represent while each agent can evolve if learning and adaptation techniques (e.g. neural networks, evolutionary algorithms) are applied, thus allowing unanticipated behaviours to emerge (Bonabeau 2002).

ABM has been recently introduced in the study of crime (Groff & Mazerolle 2008; Hegemann et al. 2011; Chainey & Tompson 2012; Birks, Townsley & Stewart 2012), for example, for resource allocation purposes (Kennedy, Caplan & Piza 2011), to analyse offending and crime hot spots (Groff 2007; Kikuchi, Amemiya & Shimada 2012), violent behaviour (Bosse, Gerritsen & Treur 2009) and prevention mechanisms (Groff & Birks 2008; Malleson, Heppenstall & See 2010; Caplan, Kennedy & Petrossian 2011). Considering that ABM can be used to analyse existing crime data and explore underlying patterns, a brief research proposal is outlined.

The aim of such research would be to build an accurate agent-based model, which can be used to initially predict rates of victimisation and then costs incurred by the victimisation incident (following observation). The agents in the model will denote potential victims and the agent's descriptors will reflect reality using data and information from victimisation and life satisfaction surveys alongside artificial intelligence. Incorporating spatial information from databases with geographic information systems (GIS) and census data for the specific area of study (e.g. Cardiff city centre), one can create a realistic virtual environment to complement the study. The prototype model will simulate real time data and although at fist interactions between the behaviour of the agents and the virtual environment may seemingly be simple, it could be

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trained to produce crime hotspots (e.g. clusters) similar to those in real data. The environment can also be designed to also incorporate several costs layers, such as individual costs (private counselling), household costs (avertive mechanisms), community/neighbourhood costs (CCTV installation, additional patrol), property prices etc. Following observation and the preliminary results emerging from the model, the agent's behaviour may be constantly improved for the observed costs incurred by the crime incident to match the predictions of the model. Although this is a simplistic proposal, a more detailed approach in the design of such a research may produce novel insight to costing crime, as the obtained results will reflect actual social processes and not hypothetical settings.

Aside from the valuation component, findings in this research indicated the need for a metric that unifies the concepts of injury typology and severity when studying the physical effects of crime in violent victimisation (see Chapter 4). Given that one of the features of the ED data is that all assault-related injury cases are likely to be above a certain threshold of pain and/or severity, pain severity can be used as a suffering indicator for the typology of certain crimes. In other words, the pain and the suffering inflicted on the victim by the sustained injuries can reveal the magnitude of the consequences of the violent act. Despite pain-thresholds vary for each individual; many validated tools can be used for this purpose. The present research project was restricted to what could be accomplished in the given time period and to the material available to the researcher, thus using any pain scale was not feasible in the current context as the available data did not include one. However, suggesting the use of a pain scale for costing intangible violence costs is a solid, new idea that can should be further explored in future research.

7.6 Concluding remarks

This thesis described all the steps involved in applying stated preference methods -specifically, contingent valuation- to violent crime reduction, from the initial literature review to the survey development and to the final dissemination of the corresponding findings. The research was carried out to bridge some of the gaps associated with valuing intangible, directly unobservable costs of violence, not only by reporting the deriving figures but also in presenting the full task

that underlies such a calculation, from the theoretical mathematical annotation to the practical computation. The exercise included a detailed assessment of the factors that increase risk of victimisation across a widely representative UK sample, which that demonstrated the importance of socio-demographic characteristics and situational factors such as use of force/violence, injury severity/typology and victim intoxication not only in predicting harm from violence but also in predicting the severity of victim's emotional responding. Altogether, the epidemiological findings of this research indicated that aside targeting specific groups of risk-prone, vulnerable individuals as reflected by the socio-demographic characteristics identified here, policy interventions that seek to prevent crime should also acknowledge and address the situational factors that appear pivotal in the aftermath of a violent crime. In the words of Brennan et al. (2010, p. 227) "*Speedy response to violent incidents by emergency services and other guardians, combined with reliable information about violence locations and public awareness of increased vulnerability to violent injury while intoxicated is likely to play a considerable role in reducing the harm caused by violence*".

   The contingent valuation exercise followed and built upon, without being limited to, a number of studies that have used stated preference techniques to measure willingness to pay to avoid or reduce victimisation and other (crime) risks. Estimating the value of a reduction in violence determined and by extent the benefits of preventing violent crime is essential for policy makers to determine whether there are significant returns on investment from preventative interventions. The numerical findings reported here can contribute in cost benefit analysis of crime interventions. For example, one use of the WTP is through the 'cost of statistical crime', denoting the average monetary amount a person would pay to completely avoid a certain crime from happening, that if multiplied by the annual number of incidents of that specific type of crime would give an estimate of the aggregate costs of crime (Atkinson, Healey & Mourato 2005). More specifically, Atkinson, Healey and Mourato (2005, p. xx) suggest this metric as "[…] *a useful indicator for assessing the benefits of policy interventions that seek to reduce crime by a given (predicted) number of offences (…) calculated as mean or median WTP for a marginal reduction in risk multiplied by the relevant (at-risk) population denominator*". Moore et al. (2012) provided another example, referring to the suitability of the resource allocation in interventions that aim to reduce violence in licensed premises (Moore et al. 2010) highlighting the significance of understanding both the costs and the benefits incurred from their delivery: "*Assuming a randomised controlled trial demonstrates that the*

intervention is successful in bringing down the prevalence of violence then the ratio of costs to benefits would provide an indication of cost-effectiveness" (Moore 2013, personal communication).

As argued in this thesis, measuring the benefits associated with violence can be inherently problematic, especially when it comes to valuing the effect of violence on victims, or 'intangible' costs. However, it is probably less easy to rationalise avoiding to do so (Loomes 2007). Public money is being spent every day to fund prevention interventions or policies that target criminal offending. Assuming that such initiatives have been assessed before their implementation, victims costs would have already been considered in any cost benefit exercise. Without any definite metrics for intangible costs, such an assessment will always be questionable. Although one can argue that alternative metrics such as QALYs, medical costs averted or other relevant value transfers can be used instead, these values cannot be considered universal or readily transferable due to the diversity in systems across countries (Corso, Ingles & Roldos 2013). The application of the CV methodology as a benefits measure in benefit-cost analysis is thus vital in the field of violence prevention as it provides not only a better understanding of these otherwise unobservable costs but also a tool in test the cost benefit of violence reduction projects.

According to Atkinson, Healey and Mourato (2005, pp.580-1) "*A more explicit assessment is needed of the monetary value of crime reduction, not just to improve the transparency of public decision making but also to ensure that policy benefits can be compared directly with the costs of implementation. Whilst economic considerations are not the sole criterion for judging the desirability of specific crime prevention programmes, enabling more explicit cost-benefit comparisons can lead to more consistent priority setting where decision-making is (at least partly) concerned with allocating available resources to maximum social advantage*".

To that end, the estimated WTP and WTA represent significant values that society places on preventing violent crimes and clearly reflect not only the importance but also the magnitude of the losses associated with the intangible/victims' costs of violence. Once this benefits estimate is validated nationally and coupled with evidence of effective programs, policies and interventions to prevent violent crime and their costs, these data will prove useful to policy makers considering how to allocate scarce public resources for improving violence prevention.

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Appendix 1: Complementary material for Chapter 4

1.1 BCS 2008/09 File-level information

The final dataset comprised the following files: (i) main BCS data set, (ii) the drinking behaviour file, (iii) drug use, (iv) interpersonal violence and (v) low-level geographic data module files (n=53,387). The table below illustrates the actual BCS reference for each dataset alongside its corresponding number of responses and variables.

|	Questioning Domains				
	Core BCS data set		Special License Self-Completion Modules		
	Non-Victim Form (NVF)	Victim Form (VF)	Interpersonal Violence (SN 6371)	Drug Use (SN 6370)	Drinking Behaviour (SN 6369)
File Name	bcs_apr08mar09_nvf_to_esrc	bcs_apr08mar09_vf_to_esrc	bcs_apr08mar09_inter-personal_violence	bcs_apr08mar09_drug_misuse	bcs_apr08mar09_drinking_behaviour
No. of variables	1,847	1,292	735	208	21
No. of cases	46,286	16,184	33,903	33,879	33,903

1.2 Manchester Triage Scale (MTS)

The Manchester Triage Scale (MTS: see Manchester Triage Group 1997) was jointly developed by the Royal College of Nursing Accident and Emergency Association and the British Association for Accident and Emergency Medicine. The MTS involves the use of 52 separate flow charts that require the decision-maker to select the appropriate algorithm on the basis of the presenting complaint and then gather and analyse information according to life threat, pain, haemorrhage, consciousness level, temperature and the duration of signs and symptoms. The MTS system aims to ensure that the patient is seen in order of clinical need, rather than in order of attendance. Each patient is placed into a category with a desired target time in which to be seen. Although these times have been pre-established, in reality they vary based on the emergencies arriving into the department.

Five categories of the Manchester Triage System

Number	Colour	Priority Category	Example	Estimated patient waiting time

1 - First	Red	Immediate	Cardiac arrest	No waiting time
2 - Second	Orange	Very urgent	Cardiac chest pain	Seen within 10 minutes
3 - Third	Yellow	Urgent	Broken bones	Seen within 60 minutes
4 - Fourth	Green	Standard	Abdominal pains	Seen within 120 minutes
5 - Fifth	Blue	Non-urgent	Minor wounds	Seen within 240 minutes
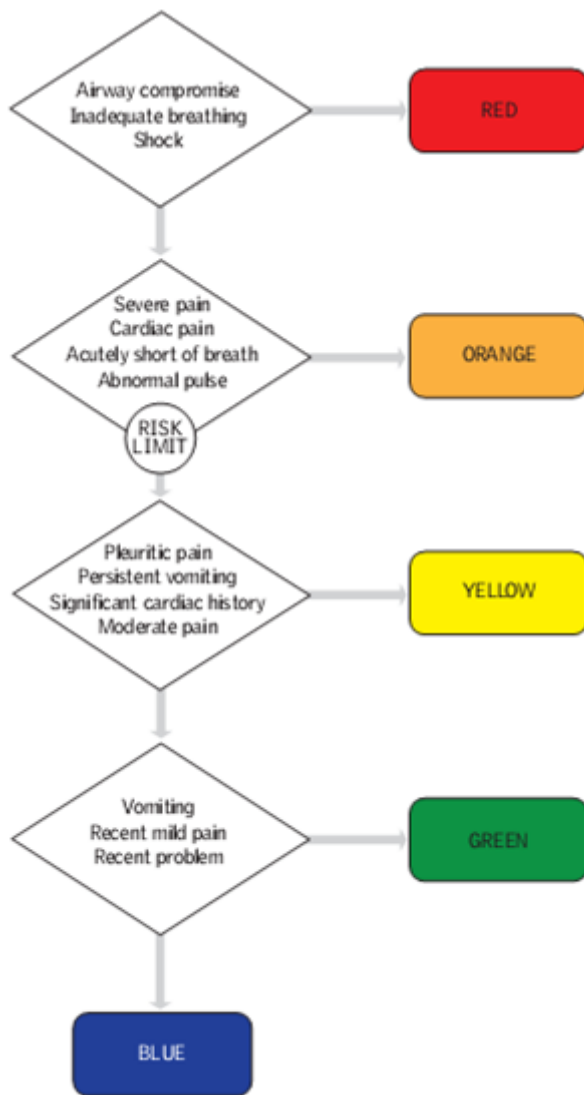
MTS - chest pain flow chart: Illustrates the questions asked by the nurse to retrieve the information required to allocate the patient to one of the five MTS priority categories (Source: Ganley & Gloster 2011, p.52).

1.3 Tables of injury specifications and medical diagnosis in ED data

Physical Injury Location	Frequency	Percent	Anatomical Site
Abdomen	434	1.08	Torso
Achromio-Clavicular Joint	155	0.39	Limbs
Ankle	460	1.15	Limbs
Ano-Rectal Region	1	0.00	Torso
Axilla	15	0.04	Limbs
Breast	23	0.06	Torso
Buttock	67	0.17	Torso
Cervical Spine	217	0.54	Torso
Chest	1,622	4.05	Torso
Ear	712	1.78	Head
Elbow	638	1.59	Limbs
Eye	2,221	5.55	Head
Face	9,730	24.30	Head
Finger	1,066	2.66	Limbs
Foot	325	0.81	Limbs
Forearm	906	2.26	Limbs
Genitalia	49	0.12	Torso
Groin	18	0.04	Limbs
Hand	2,154	5.38	Limbs
Head	8,044	20.09	Head
Hip	97	0.24	Limbs
Knee	634	1.58	Limbs
Loin	79	0.20	Torso
Lower Leg	437	1.09	Limbs
Lumbo-sacral Spine	361	0.90	Torso
Mouth	1,883	4.70	Head
Neck	874	2.18	Torso
Nose	2,417	6.04	Head
Pelvis	29	0.07	Torso
Shoulder	119	0.30	Limbs
Shoulder Joint	632	1.58	Limbs
Spine	21	0.05	Torso
Teeth	230	0.57	Head
Thigh	329	0.82	Limbs
Thoracic Spine	192	0.48	Torso
Throat	76	0.19	Head
Thumb	505	1.26	Limbs
Toe	96	0.24	Limbs
Unspecified	493	1.23	
Upper Arm	543	1.36	Torso
Wrist	1,132	2.83	Limbs
Total	40,036	100.00	

Medical Diagnosis	Frequency	Percent	Cumulative
Abrasion/Bruise	13,724	28.47	28.47
Acute Abdominal Pain	67	0.14	28.61
Arrest [Cardiac/Resp]	4	0.01	28.62
Asthma	9	0.02	28.64
Bite [Animal]	138	0.29	28.92
Bite [Human]	758	1.57	30.50
Bite/Sting	18	0.04	30.53
Burn/Scald	108	0.22	30.76
CNS	1	0.00	30.76
Cardiac Problem	30	0.06	30.82
Cerebrovascular Problem	10	0.02	30.84
Collapse Unknown Cause	8	0.02	30.86
Compound Fracture	164	0.34	31.20
Confusion	1	0.00	31.20
Convulsion	10	0.02	31.22
Dislocation/Sublux	9	0.02	31.24
Dislocation/Subluxation	134	0.28	31.52
Electric Shock	1	0.00	31.52
Endocrine	4	0.01	31.53
Epistaxis	63	0.13	31.66
Foreign Body	131	0.27	31.93
Fracture	4,412	9.15	41.08
Gastrointestinal Problem	30	0.06	41.15
Head Injury With Loss/Alt Cons	913	1.89	43.04
Hypothermia	1	0.00	43.04
Insect Sting	5	0.01	43.05
Laceration / Cut	9,997	20.74	63.79
Local Infection	158	0.33	64.12
Multiple Injury	343	0.71	64.83
Needle stick Injury	16	0.03	64.86
Nerve Injury	11	0.02	64.89
OBS/GYNAE	68	0.14	65.03
OD / Ingestion	180	0.37	65.40
Ortho Non Trauma	10	0.02	65.42
Other CNS Problem	29	0.06	65.48
Other G.U.M. Problem	9	0.02	65.50
Other Problem	9,968	20.68	86.18
Other Respiratory Problem	23	0.05	86.23
P C Contraception	4	0.01	86.24
Pre-Tib Flap-Lac	5	0.01	86.25
Psychiatric Problem	21	0.04	86.29
Pulled Elbow	13	0.03	86.32
Puncture Wound	89	0.18	86.50
Pyrexia/Infection	7	0.01	86.52

Respiratory Problem	5	0.01	86.53
Skin Rash	7	0.01	86.54
Social Problem	11	0.02	86.56
Soft Tissue Injury	4,742	9.84	96.40
Sprain	1,667	3.46	99.86
Suture Removal/Dressing Change	3	0.01	99.87
Systemic Infection	5	0.01	99.88
Tendon Injury	33	0.07	99.94
Vasovagal	13	0.03	99.97
Visceral Injury	14	0.03	100.00
Total	48,204	100.00	

Appendix 2: Survey material for all battery work (complementary material for Chapter 5)

2.1 First pretesting stage

2.1.1 Pilot trial A: Questionnaire

1/4	About you

The following questions are about you. This information will be used by the researcher for describing the characteristics of the participants. This will be stored separately to the consent forms and this information will not be disclosed to anyone else.

1. Date:
   Day   Month   Year

2. Are you: Male
               Female

3. Date of Birth:
   Day   Month   Year

4. Would you mind telling us what your **total monthly income** is? By that we mean the ***total amount of money you have as income, whether it is earned or unearned, each month*** including any state benefits, regular interest on savings and so on.

   £

5. What is your ethnic group?

British or mixed British		1
Irish		2
Any other white background		3
Mixed		4
Asian or Asian British		5
Black or Black British		6
Chinese		7
Any other ethnic group		8

2/4	Entertainment & Alcohol Consumption

The following questions are about the money spending on entertainment. This information will be used by the researcher for understanding the percentage of the total amount spent for entertainment purposes that corresponds to alcohol consumption. No information that could be used to identify you is required.

6. Where do you enjoy spending time on leisure activities? Please **rate** the following activities from **most favourable** (by stating **1** in the corresponding box) to the **least favourable** (by stating **6** to the corresponding box).

Activity	Rank
Home/ Other private residence	
Licensed premises (e.g. pubs, clubs etc.)	

Cinema, Theatre or any other similar activity	
Shopping	
Sport activities	
Other hobbies/ activities (please state): _____	

7. How much of your total income do you usually spend:

	£ per week
On any leisure activity (but not including the money you spend on the purchase of alcohol)	
On alcohol	

8. Do you ever go for an alcoholic drink in Cardiff City Centre?

Yes		1
No		0
Do not know/Refused		2

9. If yes, how often in the past 12 months, have you been for a drink in Cardiff City Centre?

Daily		1
Once a week		2
Once every other week		3
Once a month		4
Less than once a month		5
Varies / Don't know		6

10. In your opinion what factors **prevent** you from drinking in Cardiff City Centre? *Select all that apply*.

Price of drinks		1
Too many people/ bars too crowded		2
Fear of getting hurt		3
Don't like the atmosphere		4
More suited to younger people		5
Transport / Difficulty getting to and from		6
Don't know / refused		7
Other (Please specify)		8

11. What is your usual alcoholic drink? - i.e. what do you drink mostly? (*Select One*)

Regular Beer/Lager (less than 5%)		1
Strong Beer/Lager (5% or stronger)		2
Alcopop		3
Cider		4
Wine		5
Spirits		6
Cocktails		7
Do not have one/ Do not know/ Refused		8

12. What size is your usual drink? (*Select One*)

Pint (568ml)		1
Half Pint (284ml)		2
Can (standard 440ml)		3
Can (large 568ml)		4
Single measure (25ml)		5
Large single measure (35ml)		6
Double measure (50ml)		7
Triple measure (75ml)		8
Standard Glass (175ml)		9
Large Glass (250ml)		10
Bottle (250ml stubby)		11
Bottle (275ml e.g. Alcopop)		12
Bottle (330ml standard)		13
Bottle (750ml e.g. wine bottle)		14
Do not know/ Refused		15

13. If ONE DRINK = ONE USUAL DRINK (the type and size you described above), how many **drinks** do you usually drink in **total** on **one occasion**?

14. How much does it cost you to buy one of your usual drinks?

£

15. MEN: How often do you have EIGHT or more drinks on one occasion?
WOMEN: How often do you have SIX or more drinks on one occasion?
Please keep in mind that one drink is ½ a pint of beer, a medium glass of wine or one shot of spirit. (*Select One*)

Never		1
Less than monthly		2
Monthly		3
Weekly		4
Daily/Almost daily		5
Varies/Don't know		6

16. How often during the last year have you been unable to remember what happened the night before because you had been drinking? (*Select One*)

Never		1
Less than monthly		2
Monthly		3
Weekly		4
Daily/Almost daily		5
Varies/Don't know		6

17. How often during the last year have you failed to do what was normally expected of you because you were drinking? For example, getting to work on time, attending lectures, completing work on time. (*Select One*)

Never		1
Less than monthly		2
Monthly		3
Weekly		4

Daily/Almost daily		5
Varies/Don't know		6

18. In the last year has a relative or friend, or a doctor or other health worker been concerned about your drinking or suggested you cut down? (*Select One*)

No		1
Yes, on one occasion		2
Yes, on more than one occasion		3
Refused		4

19. At what age did you have your first alcoholic drink? (*Select One*)

5-9 Years		1
10-14 Years		2
15-18 Years		3
Over 18 Years		4
Do not know/Refused		5

3/4	**Previous victimisation experience**	

The following questions concern you or your acquaintances experiences of being a victim of violence.

20. Have **you** ever been physically injured due to violent assault?

Yes		1
No		0
Do not know/Refused		2

21. If you answered yes in Q20 where did the most recent incident take place? *Select all that apply.*

Own home or own garage		1
Immediately outside home		2
In or near place of work		3
In public car park		4
In/around pub/bar/night club		5
In/around dancehall/disco		6
In/around football ground/other sports		7
In/around sports centre/sports club		8
In/around other place of public entertainment		9
Travelling on transport or near transport		10
In/around petrol station forecourt		11
Other public or commercial locations		12
Elsewhere (please state)		13
Do not know		14
Refused		15

22. If you answered yes in Q20 were you under the influence of alcohol at that time?

Yes		1
No		0
Do not know/remember		2
Not Applicable		3

23. If you answered yes in Q20 was the assailant under the influence of alcohol at that time?

Yes		1

No		0
Do not know/remember		2
Not Applicable		3

24. Has anyone close to you (family member, friend, others known to you) ever been physically injured due to violent assault?

Yes		1
No		0
Do not know/Refused		2

25. If you answered yes in Q26 where did the incident take place? *Select all that apply.*

Own home or own garage		1
Immediately outside home		2
In or near victim's place of work		3
In public car park		4
In/around pub/bar/night club		5
In/around dancehall/disco		6
In/around football ground/other sports		7
In/around sports centre/sports club		8
In/around other place of public entertainment		9
Travelling on transport or near transport		10
In/around petrol station forecourt		11
Other public or commercial locations		12
Elsewhere		13
Do not know		14
Refused		15

26. If you answered yes in Q24 was the victim under the influence of alcohol at that time?

Yes		1
No		0
Do not know/Refused		2
Not Applicable		3

27. If you answered yes in Q24 was the assailant under the influence of alcohol at that time?

Yes		1
No		0
Do not know/Refused		2
Not Applicable		3

28. If you had any recent physical injuries due to (a) violent incident(s)/assault(s) could you please specify the location on your body that was injured? *Select all that apply.*

FACE/HEAD		
Bruising (e.g. Black eye)		1
Scratches/ Cuts		2
Broken nose		3
Superficial injuries		4
Internal injuries		5
Broken/lost/chipped teeth		6
Other (please specify)		7

TORSO

Contusions (e.g. bruises, haematomas)		8
Scratches/ Cuts		9
Fractures /Broken bones		10
Open wounds		11
Internal injuries		12
Superficial injuries		13
Other (please specify)		14

LIMBS

Contusions (e.g. bruises, haematomas)		15
Scratches/ Cuts		16
Fractures /broken bones		17
Internal injuries		18
Superficial injuries		19
Other (please specify)		20

4/4   Willingness To Pay (WTP) & Willingness To Accept (WTA)

The following questions ask whether you would be willing to pay a certain amount of money to avoid an event that is described in each question. Willingness to pay (WTP) is the maximum amount a person would be willing to pay, sacrifice or exchange for a good. By providing your subjective evaluation of situations that involve monetary transactions you help the researcher estimate monetary values for resources and relate the intangible costs as they derive from unpleasant situations to tangible monetary values.

You will be asked (i) how much of your own money you would be willing to pay to avoid an undesirable change or, alternatively, (ii) how much you would ask for as compensation to accept that change.
In some cases you will be asked to vote "*for*" or "*against*" a proposal that would require you to pay a certain amount of money.
Some questions will ask you to make trade-offs among different alternatives. In those questions you can choose more than one alternatives and rate them according to your preference.
Remember that any money you agree to spend on crime prevention is your money that could otherwise be used for your own food, clothing or whatever you need.

29. **1.** Suppose you were asked to **vote** on the implementation of a programme in the area where you live and socialise that had already successfully prevented early evening and late night (non-domestic) violent assaults in a community similar to yours by 10%.

- How would you vote on the introduction of this programme?

For		1
Against		0

2. Suppose you were asked to **vote** on the implementation of a programme in the area where you live and socialise that had already successfully prevented early evening and late night (non-domestic) violent assaults in a community similar to yours by 20%.

- How would you vote on the introduction of this programme?

For		1
Against		0

3. Suppose you were asked to **vote** on the implementation of a programme in the area where you live and socialise that had already successfully prevented early evening and late night (non-domestic) violent assaults in a community similar to yours by 30%.

- How would you vote on the introduction of this programme?

For		1
Against		0

30. Suppose that you were asked to vote for this prevention programme to reduce violence but money would have to be raised to pay for it by asking you and adults living in your area to pay a set amount.

- What is the most you would be willing to pay **per month** to reduce the chance of victimisation by 10%? £_____
- What is the most you would be willing to pay **per month** to reduce the chance of victimisation by 20%? £_____
- What is the most you would be willing to pay **per month** to reduce the chance of victimisation by 30%? £_____

31. Suppose that you were asked to vote for this prevention programme to reduce violence but money would have to be raised to pay for it by increasing the price people pay for their leisure activities generally.

- What is the most you would be willing to pay **per night out** to reduce the chance of victimisation by 10%? £_____
- What is the most you would be willing to pay **per night out** to reduce the chance of victimisation by 20%? £_____
- What is the most you would be willing to pay **per night out** to reduce the chance of victimisation by 30%? £_____

32. Suppose that you were asked to vote for this prevention programme to reduce violence but money would have to be raised to pay for it by increasing the price of alcohol.

- How much EXTRA would you be willing to pay **on top of the price you pay for your usual drink** to reduce the chance of victimisation by 10%? £_____
- How much EXTRA would you be willing to pay **on top of the price you pay for your usual drink** to reduce the chance of victimisation by 20%? £_____
- How much EXTRA would you be willing to pay **on top of the price you pay for your usual drink** to reduce the chance of victimisation by 30%? £_____

33. Suppose that the same prevention programme described above also paid compensation to victims in the event that they were assaulted. Knowing that,

- how would you vote on the introduction of this programme?

For		1
Against		0

34. Suppose that such a programme was already on-going in your area and you were victimised during a night out socialising would you be willing to accept money in compensation?

Yes		1
No		0
Do not know/ Refused		2

35. Taking into consideration your previous answers, if you sustained superficial injuries that were not disabling in any way, then the total amount of money you could ask for in compensation would be significantly lower. That is compared to more severe injuries that would imply you had to stay away from your normal day to day activities for a while. Would you consider this fair?

Yes		*1*
No		*0*
Do not know/ Refused		*2*

36. We are trying to understand the value of violence. If you had a car, most people would eventually sell that car if someone offered enough money. Similarly, if you wanted to buy the same car, there is a limit to how much you would be willing to pay for it.

WTP: Imagine that you were going to be a victim of violence and had the opportunity to pay to escape victimisation.

36.1. What is the most you would be willing to pay to avoid being a victim of violence?

£

WTA: Imagine now that someone wanted you to be a victim of violence and were willing to pay you.

36.2. How much would you need to be paid to suffer victimisation?

£

37. In this question we will describe several scenarios. You will then be asked to indicate your preference for each scenario.

♣ **Scenario A**

You sustain *minor* injuries to your *face and/or head* such as slight scratching, a black eye through getting slapped, or punched etc. These injuries *will not need medical attention*, will not be life threatening, although they will be noticeable by people around you they would not leave any permanent scars. These injuries *will not prevent you from performing normal day to day activities.*

♣ **Scenario B**

 You sustain *serious* injuries to your *face and/or head*, such as a broken nose, broken or chipped teeth. These injuries will require medical treatment but will not be life threatening. People will notice the change in your face and the injuries are expected to leave a minor change in your appearance. These injuries *will prevent you from performing your everyday normal activities;* will mean you will take time off from work or study, until they heal, but no long-term disability.

♣ **Scenario C**

You sustain *slight* injuries to your *torso*, such as slight scratching, minor cuts, and other superficial injuries. These injuries will *not need medical attention*, will not be life threatening, but they will be noticeable by people around you. These injuries would *not leave any significant scarring and will not prevent you from performing normal activities.*

♣ **Scenario D**

You sustain *serious* injuries to your *torso*, such as broken bones, fractures, internal injuries (if punched at the abdomen area) etc. These injuries *require medical treatment and attention*. They will not be life threatening but will be serious enough to *prevent you from performing your everyday normal activities* for a while and you will need to take time away from work or study. You will need assistance from others and will stay at hospital for a time. The injuries will not leave any scarring visible to others.

♣ **Scenario E**

You sustain *slight* injuries to your *limbs (legs or arms),* such as slight scratching, minor cuts, and other superficial injuries. These injuries *will not need medical attention*, will not be life threatening, but they will be

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noticeable by people around you. These injuries would *not leave any significant scarring* and will *not prevent you from performing normal activities*.

+ **Scenario F**

   You sustain *serious* injuries to your *limbs (legs or arms),* such as broken bones, fractures etc. These injuries require medical treatment and attention. They will not be life threatening but will be serious enough to *prevent you from performing your everyday normal activities* for a while and you will need to take time away from work or study. You will need assistance from others and will stay at hospital for a time. The injuries will not leave any scarring visible to others.

Now could you please rate the above scenarios marking the number of preference in the corresponding box below?
*Note that **1** stands for your **most favourable** scenario whilst 6 for your least one.*

Rank	Scenario (A, B, C etc.)
1 (least disliked)	
2	
3	
4	
5	
6 (most disliked)	

38. Suppose now that you had the chance to somehow reduce the chance of enduring any of those scenarios but you had to pay for it. State the maximum amount of money you would pay to prevent each of those scenarios.

- How much would you be willing to pay prevent the chance of **Scenario A** from happening by 10%?
  £_____
- How much would you be willing to pay prevent the chance of **Scenario A** from happening by 20%?
  £_____
- How much would you be willing to pay prevent the chance of **Scenario A** from happening by 30%?
  £_____

- How much would you be willing to pay prevent the chance of **Scenario B** from happening by 10%?
  £_____
- How much would you be willing to pay prevent the chance of **Scenario B** from happening by 20%?
  £_____
- How much would you be willing to pay prevent the chance of **Scenario B** from happening by 30%?
  £_____

- How much would you be willing to pay prevent the chance of **Scenario C** from happening by 10%?
  £_____
- How much would you be willing to pay prevent the chance of **Scenario C** from happening by 20%?
  £_____
- How much would you be willing to pay prevent the chance of **Scenario C** from happening by 30%?
  £_____

- How much would you be willing to pay prevent the chance of **Scenario D** from happening by 10%?
  £_____
- How much would you be willing to pay prevent the chance of **Scenario D** from happening by 20%?
  £_____

- How much would you be willing to pay prevent the chance of **Scenario D** from happening by 30%?
  £_____

- How much would you be willing to pay prevent the chance of **Scenario E** from happening by 10%?
  £_____
- How much would you be willing to pay prevent the chance of **Scenario E** from happening by 20%?
  £_____
- How much would you be willing to pay prevent the chance of **Scenario E** from happening by 30%?
  £_____

- How much would you be willing to pay prevent the chance of **Scenario F** from happening by 10%?
  £_____
- How much would you be willing to pay prevent the chance of **Scenario F** from happening by 20%?
  £_____
- How much would you be willing to pay prevent the chance of **Scenario F** from happening by 30%?
  £_____

39. Suppose now that you had the chance of GETTING PAID to endure each of those scenarios. State the maximum amount of money you would accept for to enduring each of those scenarios.

How much would you be willing to accept for enduring **Scenario A**? £_____
How much would you be willing to accept for enduring **Scenario B**? £_____
How much would you be willing to accept for enduring **Scenario C**? £_____
How much would you be willing to accept for enduring **Scenario D**? £_____
How much would you be willing to accept for enduring **Scenario E**? £_____
How much would you be willing to accept for enduring **Scenario F**? £_____
You would not accept money to endure ANY of those scenarios

40. Suppose now that you were asked by an insurance company to estimate how much you would spend dealing with the consequences of each scenario. The insurance company is interested in how much you would spend on medical supplies not routinely provided by the NHS (e.g. plasters, paracetemol), or any other costs that would be derived from the experience of victimisation.

Scenario	Monetary equivalent (£)
A	
B	
C	
D	
E	
F	

41. Now suppose that the same insurance company wanted your opinion on how much compensation should be paid to victims in the above scenarios.

Scenario	Compensation £
A	
B	
C	
D	
E	
F	

42. Now, let's assume that your local authority has resources to implement a violence reduction programme funded by the local community. All residents of the area will pay the same daily fee, and the money collected will be used to finance the security improvements in your area. However, resources are limited and you are asked to choose which types of crime the programme should try and reduce.

You are asked to **decide** on the following:

	Yes	N0
Resources should be used to reduce injuries described in Scenario A rather than Scenario B?		
Resources should be used to reduce injuries described in Scenario B rather than Scenario C?		
Resources should be used to reduce injuries described in Scenario C rather than Scenario D?		
Resources should be used to reduce injuries described in Scenario D rather than Scenario E?		
Resources should be used to reduce injuries described in Scenario E rather than Scenario F?		

(Answer only if you have selected NO to all the answers above.)

Did you select No because you believe that:

The damage is not significant	
Other (Please specify)	

2.1.2 Pilot trial B: Questionnaire

In this questionnaire we will ask a series of questions relating to the value of violence. While it is easy to work out how much it would cost to replace a car if it were stolen, working out the true victim cost of violence is more difficult. Violence is generally held as a serious crime, yet we currently have little information on how best to measure it. Some of the questions will seem unusual; however there are reasons for this and we can explain what they mean once you have completed the questions. In the meantime, please try and answer each question as honestly as you can.

1. Where do you enjoy spending time on leisure activities?

Activity	*Rating*
Home/ Other private residence	Always – Often – Sometimes – Rarely – Never
Licensed premises (e.g. pubs, clubs etc.)	Always – Often – Sometimes – Rarely – Never
Cinema, Theatre or any other similar activity	Always – Often – Sometimes – Rarely – Never
Shopping	Always – Often – Sometimes – Rarely – Never
Sport activities	Always – Often – Sometimes – Rarely – Never
Other hobbies	Always – Often – Sometimes – Rarely – Never

2. How much of your total income do you usually spend **per week** for all your **leisure** activities?   £ [   ]

3. Imagine that there is a programme that can reduce early-evening and late night (non-domestic) violence. This programme has already been shown to work in an area very similar to where you live and socialise. You are being asked to vote on whether you would like the programme introduced in your area.

How would you vote on the introduction of this programme if it prevented early evening and late night (non-domestic) violent assaults to your community:

i.	By 10%?	For	[ ]	Against	[ ]
ii.	By 20%	For	[ ]	Against	[ ]
iii.	By 30%	For	[ ]	Against	[ ]

4. Now suppose that the introduction of this programme into your area costs money. You and other residents in your area are being asked for a regular monthly payment.

What is the **most** you would be willing to pay **per month** to reduce the chance of victimisation:

   i. By **10**%?   £ _____
   ii. By **20**%   £ _____
   iii. By **30**%   £ _____

5. Imagine that, instead of a regular monthly payment, the violence-reduction programme could be alternatively funded, using indirect ways to raise that money.

   What is the **most** you would be willing to pay in total **per evening out** to reduce the chance of victimisation:

   i. By **10**%?   £ _____
   ii. By **20**%   £ _____
   iii. By **30**%   £ _____

6. Similarly to Q5, suppose that the point of reference now is the price of some social activities, e.g. cinema/sport tickets, food, alcohol.

How much EXTRA would you be willing to pay **on top of the price you pay for your usual social activity** to reduce the chance of victimisation:

   i. By **10**%?   £ _____
   ii. By **20**%   £ _____
   iii. By **30**%   £ _____

7. Suppose that the same prevention programme described above also **paid compensation to victims** in the event that they were assaulted. Knowing that, how would you vote on the introduction of this programme if it also reduced violence

   i. By 10%?   For   Against
   ii. By 20%   For   Against
   iii. By 30%   For   Against

8. Suppose that such a programme was already on-going in your area and you were victimised during a night out socialising would you be willing to **accept money in compensation**?

Yes   1   No   Do not know   2

9. Suppose now that **compensation** to victims was **based on injury severity**. If you sustained minor injuries then the total amount of money you could ask for in compensation would be significantly lower compared to victims sustaining more severe injuries. Are you in favour of compensation in proportion to injury severity?

Yes   1   No   0   Do not know   2

10. In this question we will briefly describe six scenarios and ask questions on each. Each scenario describes a plausible set of injuries that you might sustain if you were a victim of assault.

We will ask you for the **maximum** amount you would be willing to pay to pay to reduce the chance of sustaining the described injuries through violence.
We will then ask a hypothetical question where you are given the opportunity to accept money in return for suffering injuries through violent victimisation. In these questions, please try to estimate the **minimum** amount of money you would **accept**.

✚ Scenario A

You sustain **minor injuries** to your **face and/or head** such as slight scratching, bruising (black eye) or other superficial injuries. These injuries will **not** need medical attention and will **not** prevent you from performing normal day to day activities. However, they will be noticeable by people around you.

How much would you be willing to pay prevent the chance of Scenario A from happening by **10%**?	£ _____
How much would you be willing to pay prevent the chance of Scenario A from happening by **20%**?	£ _____
How much would you be willing to pay prevent the chance of Scenario A from happening by **30%**?	£ _____
How much would you be willing to accept for enduring Scenario A?	£ _____

✚ Scenario B

You sustain **serious injuries** to your **face and/or head**, such as a broken nose, broken teeth, internal injuries etc. These injuries will **require** medical treatment and will **prevent** you from performing your everyday normal activities until they heal (e.g. need to take time off from work/study). People will notice the change in your face and the injuries are expected to leave a **minor** change in your appearance but **no** long-term disability.

How much would you be willing to pay prevent the chance of Scenario B from happening by **10%**?	£ _____
How much would you be willing to pay prevent the chance of Scenario B from happening by **20%**?	£ _____
How much would you be willing to pay prevent the chance of Scenario B from happening by **30%**?	£ _____
How much would you be willing to accept for enduring Scenario B?	£ _____

✚ Scenario C

You sustain **slight** injuries to your **torso**, such as slight scratching, minor cuts or other superficial injuries. These injuries will **not** need medical attention, will **not** be life threatening, but they **will** be noticeable by people around you. These injuries will **not** leave any significant scarring and will **not** prevent you from performing normal activities.

How much would you be willing to pay prevent the chance of Scenario C from happening by **10%**?	£ _____
How much would you be willing to pay prevent the chance of Scenario C from happening by **20%**?	£ _____
How much would you be willing to pay prevent the chance of Scenario C from happening by **30%**?	£ _____
How much would you be willing to accept for enduring Scenario C?	£ _____

✚ Scenario D

You sustain **serious** injuries to your **torso**, such as broken bones, fractures, internal injuries (if punched at the abdomen area) etc. These injuries will **require** medical treatment, attention and hospital stay. They will **not** be life threatening but **will** be serious enough to **prevent** you from performing your everyday normal activities until they heal (e.g. need to take time off from work/study, assistance from others). The injuries will **not** leave any scarring visible to others.

How much would you be willing to pay prevent the chance of Scenario D from happening by **10%**?	£ _____
How much would you be willing to pay prevent the chance of Scenario D from happening by **20%**?	£ _____
How much would you be willing to pay prevent the chance of Scenario D from happening by **30%**?	£ _____
How much would you be willing to accept for enduring Scenario D?	£ _____

↓ *Scenario E*

You sustain **slight** injuries to your **limbs** (legs or arms), such as scratching, cuts, or other superficial injuries. These injuries will **not** need medical attention and will **not** prevent you from performing normal activities. They will **not** leave any significant scarring though they **will** be noticeable by people around you.

How much would you be willing to pay prevent the chance of Scenario E from happening by **10%**?	£ _____
How much would you be willing to pay prevent the chance of Scenario E from happening by **20%**?	£ _____
How much would you be willing to pay prevent the chance of Scenario E from happening by **30%**?	£ _____
How much would you be willing to accept for enduring Scenario E?	£ _____

↓ *Scenario F*

You sustain **serious** injuries to your **limbs** *(legs or arms),* such as broken bones, fractures etc. These injuries will **require** medical treatment, attention and hospital stay. They will **not** be life threatening but **will** be serious enough to **prevent** you from performing your everyday normal activities until they heal (e.g. need to take time off from work/study, assistance from others). The injuries will **not** leave any scarring visible to others.

How much would you be willing to pay prevent the chance of Scenario F from happening by **10%**?	£ _____
How much would you be willing to pay prevent the chance of Scenario F from happening by **20%**?	£ _____
How much would you be willing to pay prevent the chance of Scenario F from happening by **30%**?	£ _____
How much would you be willing to accept for enduring Scenario F?	£ _____

11. Now could you please **rank** scenarios A to F in the box below? *Note that **1** stands for your **most favourable** scenario whilst **6** for your **least** one.*

Scenario		Description	Rank (1: most favourable – 6: least favourable)
A ⎫	Head	Minor injuries	
B ⎬		Severe injuries	
C ⎫	Torso	Minor injuries	
D ⎬		Severe injuries	
E ⎫	Limbs	Minor injuries	
F ⎬		Severe injuries	

12. Suppose now that you were asked by an insurance company to estimate how much you would spend dealing with the consequences of each scenario, bearing in mind the inflicted emotional and psychological distress.

The insurance company is interested in how much you would spend **trying to cope** with the experience of victimisation. That includes any types of costs (besides those covered by the NHS) that would be derived from such an experience, for example lost income through taking some time off work, visiting and paying for a psychotherapist, cosmetic surgery, losing your job, shopping therapy, going on a holiday, etc.

Scenario		Description	Monetary equivalent (£)
A ⎫	Head	Minor injuries	
B ⎬		Severe injuries	
C ⎫	Torso	Minor injuries	
D ⎬		Severe injuries	
E ⎫	Limbs	Minor injuries	
F ⎬		Severe injuries	

13. Now suppose that the same insurance company wanted your opinion on how much compensation should be paid to victims in the above scenarios. Please answer bearing in mind the emotional and psychological distress inflicted by each of the scenarios.

Scenario		Description	Compensation (£)
A	} Head	Minor injuries	
B		Severe injuries	
C	} Torso	Minor injuries	
D		Severe injuries	
E	} Limbs	Minor injuries	
F		Severe injuries	

14. Assuming that **any** of those scenarios could happen to you and you do to know beforehand which one of those it would be:

- What is the **most** you would be willing to **pay** to **avoid** it? £ [   ]

- How much would you need to **be paid** to **suffer** it? £ [   ]

15. Now, let's assume that your local authority has resources to implement a very specific violence reduction programme. The chosen violence reduction programme can reduce violent crimes that produce injuries described in the above six scenarios. However, resources are limited and you are asked to choose which type of crime the programme should try and reduce. You are asked to **decide** on the following:

	Yes	N0
Resources should be used to reduce injuries described in Scenario B rather than Scenario D?		
Resources should be used to reduce injuries described in Scenario D rather than Scenario F?		
Resources should be used to reduce injuries described in Scenario F rather than Scenario B?		
Resources should be used to reduce injuries described in Scenario A rather than Scenario C?		
Resources should be used to reduce injuries described in Scenario C rather than Scenario E?		
Resources should be used to reduce injuries described in Scenario E rather than Scenario A?		

If you have selected **NO** to **any** of the answers **above** was it because you believe that the injuries described were not significant?

Yes [   ] 1   No [   ] 0   Do not know [   ] 2

16. Have **you** ever been physically injured due to violent assault? *(If NO, skip to Q21)*

Yes [   ] 1   No [   ] 0   Do not wish to answer [   ]

17. **If yes** were you under the influence of alcohol at that time?

Yes [   ] 1   No [   ] 0   Do not know [   ] 2   Do not wish to answer [   ] 3

18. Do you think the assailant was under the influence of alcohol at that time?

Yes [   ] 1   No [   ] 0   Do not know [   ] 2   Do not wish to answer [   ] 3

19. Where did the most recent violent incident take place in which you sustained injury? *(Select all that apply)*

In/around own home (e.g. own garage, immediately outside home) [   ] 1
In or near place of work [   ] 2
In public/commercial locations (e.g. public car park) [   ] 3

In/around place of public entertainment (e.g. pub/bar/night club/cinema)	4
In/around sport related areas (e.g. football ground, sports centre/club)	5
Travelling on transport or near transport	6
Elsewhere (please state)	7
Do not know	8
Do not wish to answer	9

20. If you had any recent physical injuries due to (a) violent incident(s)/assault(s) could you please specify the locations on your body that were injured? *(Select all that apply)*

FACE/HEAD

Superficial injuries (e.g. Scratches/ Cuts, Bruising)	1
Significant head injuries (e.g. concussion, internal injuries)	2
Broken nose or teeth damage (lost/chipped/broken)	3
Other (please specify)	4

TORSO

Superficial injuries (e.g. Scratches/ Cuts, Bruising)	5
Fractures /Broken bones	6
Internal injuries	7
Other (please specify)	8

LIMBS

Superficial injuries (e.g. Scratches/ Cuts, Bruising)	9
Fractures /broken bones	10
Internal injuries	11
Other (please specify)	12

21. Has anyone close to you (family member, friend, others known to you) ever been physically injured due to violent assault?
(If NO, skip to Q26)

Yes [ ] 1   No [ ] 0   Do not know [ ] 2   Do not wish to answer [ ] 3

22. Was the victim under the influence of alcohol at that time?

Yes [ ] 1   No [ ] 0   Do not know [ ] 2   Do not wish to answer [ ] 3

23. Was the assailant under the influence of alcohol at that time?

Yes [ ] 1   No [ ] 0   Do not know [ ] 2   Do not wish to answer [ ] 3

24. Where did the most recent incident take place? *(Select all that apply)*

In/around own home (e.g. own garage, immediately outside home)	1
In or near place of work	2
In public/commercial locations (e.g. public car park)	3
In/around place of public entertainment (e.g. pub/bar/night club/cinema)	4
In/around sport related areas (e.g. football ground, sports centre/club)	5
Travelling on transport or near transport	6

Elsewhere (please state)		7
Do not know		8
Do not wish to answer		9

25. Could you please specify the location on your friend/family member's body that was injured? *(Select all that apply)*

FACE/HEAD

Superficial injuries (e.g. Scratches/ Cuts, Bruising)		1
Significant head injuries (e.g. concussion, internal injuries)		2
Broken nose or teeth damage (lost/chipped/broken)		3
Other (please specify)		4

TORSO

Superficial injuries (e.g. Scratches/ Cuts, Bruising)		5
Fractures /Broken bones		6
Internal injuries		7
Other (please specify)		8

LIMBS

Superficial injuries (e.g. Scratches/ Cuts, Bruising)		9
Fractures /broken bones		10
Internal injuries		11
Other (please specify)		12

26. Do you drink alcohol? *(If NO, skip to Q33)*

Yes ☐ 1   No ☐ 0   Do not wish to answer ☐ 2

27. If 1 drink = 1/2 pint of beer or 1 glass of wine or 1 single spirits **how many** drinks do you usually have in **total** on **one occasion**? ☐

28. How much does it **cost** you to buy **one** of your usual £ ☐ drinks?

29. Keeping in mind that one drink is ½ a pint of beer, a medium glass of wine or one shot of spirit:
   – MEN: How **often** do you have **EIGHT or more** drinks on **one** occasion?
   – WOMEN: How **often** do you have **SIX or more** drinks on **one** occasion?   *(Select One)*

Never	Less than monthly	Monthly	Weekly	Daily/Almost daily	Varies/Don't know

30. How **often** during the last year have you been **unable to remember** what happened the night before because you had been drinking? *(Select One)*

Never	Less than monthly	Monthly	Weekly	Daily/Almost daily	Varies/Don't know

31. How **often** during the last year have you **failed to do** what was normally expected of you because you were drinking?
   For example, getting to work on time, attending lectures, completing work on time. *(Select One)*

Never	Less than monthly	Monthly	Weekly	Daily/Almost daily	Varies/Don't know

32. In the last year has a relative or friend, or a doctor or other health worker been **concerned** about your drinking or **suggested** you cut down? (*Select One*)

No | Yes, on one occasion | Yes, on more than one occasion

33. You are: Male [ ] 1   Female [ ] 0

34. Date of Birth:

                             Day   Month   Year

35. Would you mind telling us what your **total monthly income** is? By that we mean the ***total amount of money you have as income*** to cover your total monthly expenditure (net income/excl. tax).

£ [   ]

36. What is your ethnic group?

Ethnic group		
British or mixed British	[ ]	1
Irish	[ ]	2
Any other white background	[ ]	3
Mixed	[ ]	4
Asian or Asian British	[ ]	5
Black or Black British	[ ]	6
Chinese	[ ]	7
Any other ethnic group	[ ]	8

2.2 Second pretesting stage

2.2.1 One-to-one interviews: Questionnaire

Completing the questionnaire: Guidelines and Information

➤ In this study we are trying to **value the personal costs** of non-domestic and non-sexual violence and would like your help. Even if you have no direct experience of violence your opinion is still very much valuable to us.

   We are not trying to work out the cost of treating those who have been assaulted (e.g. the cost of hospitalisation and medicines) as that sort of information is fairly easy to get a hold of. Instead we are interested in the **pain, inconvenience and discomfort** related to assault incidents.

   Why are we asking how much would you pay?

   This might seem like a strange question but one way to estimate such costs is by asking people exactly this question. When we ask how much you would pay to avoid being assaulted, your answer can be used to provide a useful approximation for the personal cost of violence. **We are not in any way suggesting that the problems associated with violence could be resolved financially or that paying money is an acceptable way of actually reducing violence or victimisation risks.** We are just trying to value violence beyond the simple costs of treating those who have been assaulted.

➤ At the end of the survey there is space for you to leave any comments and thoughts you might have. In the meantime, we would be very grateful if you could try and answer the questions as honestly as you can. Even if answering them seems strange, please try.

➤ The questions are about you and your opinions. There are no right or wrong, good or bad answers. All responses are treated equally and have the same importance weight.

➤ Your answers will be treated in strict confidence. Any personal information will be stored separately and you will never be identified in any way.

Please tick the box that you have read and understood the information above:

SECTION A

1. You are:
   Male ☐ 1   Female ☐ 0

2. In what year where you born? _____

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3. Which of the following qualifications do you have? (*Circle one*)

| None ₁ | CSE/O' levels/GCSE ₂ | Apprenticeship or A/AS level ₃ | Professional Degree or Diploma ₄ | College or University ₅ | Higher degree (Masters, PhD etc.) ₆ |

4. How would you describe your occupational status? (*Circle one*)

| Working ₁ | Unemployed ₂ | Keeping home ₃ | Retired ₄ | Student ₅ | Other ₆ |

5. What is your ethnic group? (*Circle one*)

| British or mixed British ₁ | Other white background ₂ | Black or Black British ₃ | Asian or Asian British ₄ | Chinese ₅ | Other ₆ |

6. Do you drink alcohol? *(Tick one)*

Yes ☐ ₁   No ☐ ₀   Do not wish to answer ☐ ₂

7. **How many** of your usual alcoholic drinks do you typically have in **total** on **a single occasion**?
_____

8. How much money do you personally have each month to cover your **total monthly expenditures** (net income/excl. tax)? £ _____

9. How much do you usually spend **weekly** for **leisure** activities? £ _____

10. How often, if at all, do you worry about becoming a victim of violent crime? *(Circle one)*

| Never ₄ | Just occasionally ₃ | Some of the time ₂ | All/most of the time ₁ |

11. Do you think that policing is the most effective way to reduce violent crime? *(Tick one)*

Yes ☐ ₁   No ☐ ₀   Do not know ☐ ₂

12. Have you ever been violently assaulted or attacked while you were outside of your own home or normal place of residence? *Please consider all possible places except your home (e.g. in a pub, in the street, on public transport, at workplace). (Tick one)*

Yes ☐ ₁   No ☐ ₀   Do not know ☐ ₂   Do not wish to answer ☐ ₃

SECTION B

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13. OPTION A

Suppose you were asked to **vote** on the implementation of a programme in the area where you live and socialise that had already successfully prevented early evening and late night (non-domestic) violent assaults in a community similar to yours. How would you vote on the introduction of this programme if it prevented early evening and late night (non-domestic) violent assaults to your community:

iv.	By 10%?	For	☐	Against	☐
v.	By 20%	For	☐	Against	☐
vi.	By 30%	For	☐	Against	☐

OPTION B

Imagine that there is a partnership programme to reduce early-evening and late night (non-domestic) violence. This programme has already been shown to work in an area very similar to yours and you have to vote on whether you

would like the programme introduced in your area. How would you vote on the introduction of this programme if it prevented early evening and late night (non-domestic) violent assaults to your community:

  i.   By 10%?   For   [   ]   Against   [   ]
  ii.   By 50%   For   [   ]   Against   [   ]

14. OPTION A

Now suppose that for the implementation of this programme money would have to be raised to pay for it, by asking you and adults living in your area to pay a set amount. What is the **most** you would be willing to pay **per month** to reduce the chance of victimisation:

  iv.   By **10%**?   £ _____
  v.   By **20%**   £ _____
  vi.   By **30%**   £ _____

OPTION B

Now suppose that the introduction of this programme into your area will be paid by contributions from area residents and **cannot be started** unless a minimum amount of money is raised by people like yourself. Keeping in mind your current income and what you would give up if you made a contribution, what is the **most** you would pay **per month** to reduce the chance of victimisation:

  i.   By **10%**?   £ _____   ii.   By **50%**   £ _____

15. Suppose that for the same prevention programme for the implementation you and adults living in your area are asked to define a payable set amount. To help you, the expenditure per evening out is set as a point of reference.

What is the most you would be willing to pay **per evening out** to reduce the chance of victimisation:

  iv.   By **10%**?   £ _____
  v.   By **20%**   £ _____
  vi.   By **30%**   £ _____

16. Suppose that the same prevention programme described above also **paid compensation to victims** in the event that they were assaulted. Knowing that, how would you vote on the introduction of this programme?

For   [   ]   Against   [   ]

17. Suppose that such a programme was already on-going in your area and you were victimised during a night out socialising would you consider accepting **money in compensation**?

Definitely consider   Might or might not consider   Would not consider   Do not know

18. OPTION A

Taking into consideration your previous answers, suppose that the **compensation** scheme of the programme would be **based on the injury severity**. If you sustained minor injuries then the total amount of money you could ask for in compensation would be significantly lower compared to more severe ones. How would you support this argument?

Strongly favour   Somewhat favour   Neutral   Somewhat oppose   Strongly oppose

OPTION B

Taking into consideration your previous answers, the total amount of money you could ask for in compensation would be accordingly to the medical severity of the sustained injuries (e.g. superficial injuries →less compensation, greater injuries →greater compensation). Would you consider this fair?

Yes   [   ]   No   [   ]   Do not know   [   ]

19. In this question we will describe several scenarios.

You will then be asked assume firstly that you could to somehow reduce the chance of enduring any of those scenarios but you had to pay for it. State the **maximum** amount of money you would **pay** to prevent each of those scenarios.

Similarly suppose now that you had the chance of GETTING PAID to endure each of those scenarios. State the **minimum** amount of money you would **accept** to endure each of those scenarios.

Please remember that the survey is trying to value an intangible/non-market event. Feel free to indicate any amount you deem appropriate as you will define the value of what is described according to your opinion.

Scenario A

You sustain **minor injuries** to your **face and/or head** such as slight scratching, bruising (black eye) or other superficial injuries. These injuries will **not** need medical attention and will **not** prevent you from performing normal day to day activities. However, they will be noticeable by people around you.
What is the **most** you would pay to prevent the chance of Scenario A from happening to you:

i.   By **10**%?   £ _____
ii.   By **30**%   £ _____
iii.   By **50**%   £ _____

What is the **least** you would accept for enduring Scenario A?   £ _____

➡ Would you change your answers if the following section was added to the scenario description?

Psychological distress | You will experience repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. These symptoms would last for approximately **2 weeks**.

Yes [   ] 1   No [   ] 0   Do not know [   ] 2

Scenario B

You sustain **serious injuries** to your **face and/or head**, such as a broken nose, broken teeth, internal injuries etc. These injuries will **require** medical treatment and will **prevent** you from performing your everyday normal activities until they heal (e.g. need to take time off from work/study). People will notice the change in your face and the injuries are expected to leave a **minor** change in your appearance but **no** long-term disability.
What is the **most** you would pay to prevent the chance of Scenario B from happening to you:

i.   By **10**%?   £ _____
ii.   By **30**%   £ _____
iii.   By **50**%   £ _____

What is the **least** you would accept for enduring Scenario B?   £ _____

➡ Would you change your answers if the following section was added to the scenario description?

Psychological distress | You will experience nervousness, repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Those symptoms would last for minimum **6 months**.

Yes [   ] 1   No [   ] 0   Do not know [   ] 2

You sustain **slight** injuries to your **torso**, such as slight scratching, minor cuts or other superficial injuries. These injuries will **not** need medical attention, will **not** be life threatening, but they **will** be noticeable by people around you. These injuries will **not** leave any significant scarring and will **not** prevent you from performing normal activities.

What is the **most** you would pay to prevent the chance of Scenario C from happening to you:

i.   By **10**%?   £ _____
ii.   By **30**%   £ _____
iii. By **50**%   £ _____

What is the **least** you would accept for enduring Scenario C?   £ _____

➡ Would you change your answers if the following section was added to the scenario description?

Psychological distress | You will experience repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. These symptoms would last for approximately **2 weeks**.

Yes ☐ 1   No ☐ 0   Do not know ☐ 2

Scenario D

You sustain **serious** injuries to your **torso**, such as broken bones, fractures, internal injuries (if punched at the abdomen area) etc. These injuries will **require** medical treatment, attention and hospital stay. They will **not** be life threatening but **will** be serious enough to **prevent** you from performing your everyday normal activities until they heal (e.g. need to take time off from work/study, assistance from others). The injuries will **not** leave any scarring visible to others.

What is the **most** you would pay to prevent the chance of Scenario D from happening to you:

i.   By **10**%?   £ _____
ii.   By **30**%   £ _____
iii. By **50**%   £ _____

What is the **least** you would accept for enduring Scenario D?   £ _____

➡ Would you change your answers if the following section was added to the scenario description?

Psychological distress | You will experience nervousness, repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Those symptoms would last for minimum **6 months**.

Yes ☐ 1   No ☐ 0   Do not know ☐ 2

Scenario E

You sustain **slight** injuries to your **limbs** (legs or arms), such as scratching, cuts, or other superficial injuries. These injuries will **not** need medical attention and will **not** prevent you from performing normal activities. They will **not** leave any significant scarring though they **will** be noticeable by people around you.

What is the **most** you would pay to prevent the chance of Scenario E from happening to you:

i.   By **10**%?   £ _____
ii.   By **30**%   £ _____
iii. By **50**%   £ _____

What is the **least** you would accept for enduring Scenario E?   £ _____

Would you change your answers if the following section was added to the scenario description?

| *Psychological distress* | You will experience repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. These symptoms would last for approximately **2 weeks**. |

Yes ☐ 1   No ☐ 0   Do not know ☐ 2

Scenario F

You sustain **serious** injuries to your **limbs** *(legs or arms),* such as broken bones, fractures etc. These injuries will **require** medical treatment, attention and hospital stay. They will **not** be life threatening but **will** be serious enough to **prevent** you from performing your everyday normal activities until they heal (e.g. need to take time off from work/study, assistance from others). The injuries will **not** leave any scarring visible to others.

What is the **most** you would pay to prevent the chance of Scenario F from happening to you:

i.   By **10**%?   £ _____
ii.   By **30**%   £ _____
iii. By **50**%   £ _____

What is the **least** you would accept for enduring Scenario F?   £ _____

Would you change your answers if the following section was added to the scenario description?

| *Psychological distress* | You will experience nervousness, repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Those symptoms would last for minimum **6 months**. |

Yes ☐ 1   No ☐ 0   Do not know ☐ 2

20. Now could you please rate the above scenarios marking the number of preference in the corresponding box below? *Note that **1** stands for your **most favourable** scenario whilst **6** for your **least** one.*

Scenario		Description	Rank [1:least disliked – 6: most disliked]
A	Head	Minor injuries	
B		Severe injuries	
C	Torso	Minor injuries	
D		Severe injuries	
E	Limbs	Minor injuries	
F		Severe injuries	

21. Assuming that **any** of those scenarios could happen to you and you do to know beforehand which one of those it would be:

- What is the **most** you would be willing to **pay** to **avoid** it?   £ ☐

- How much would you need to **be paid** to **suffer** it?   £ ☐

22. OPTION A

Suppose now that you were asked by an insurance company to estimate how much you would spend dealing with the consequences of each scenario. The insurance company is interested in how much you would spend **trying to cope** with the experience of victimisation. That includes any types of costs (besides those covered by the NHS) that would be derived from such an experience, as for instance taking some time off work, visiting a psychotherapist on your own cost, cosmetic surgery, quitting your job, shopping therapy, going on holidays etc.

Scenario		Description	Monetary equivalent (£)
A	Head	Minor injuries	
B		Severe injuries	
C	Torso	Minor injuries	
D		Severe injuries	
E	Limbs	Minor injuries	
F		Severe injuries	

OPTION B

Suppose now that a non-profit victim support organisation asked you to estimate **how much you would spend** to deal with each Scenario, bearing in mind the **emotional and psychological distress** caused by each one of them. They are interested in the amount spent to **cope** with such an experience. That includes any cost type that would result each scenario, excluding those covered by the NHS (e.g. lost income through sick leave, psychotherapist visits, cosmetic surgery, job loss, shopping therapy, holiday making).

Scenario		Description	Monetary equivalent (£)
A	Head	Minor injuries	
B		Severe injuries	
C	Torso	Minor injuries	
D		Severe injuries	
E	Limbs	Minor injuries	
F		Severe injuries	

23. Now suppose that the same insurance company wanted your opinion on how much compensation should be paid to victims in the above scenarios.

Scenario		Description	Compensation (£)
A	Head	Minor injuries	
B		Severe injuries	
C	Torso	Minor injuries	
D		Severe injuries	
E	Limbs	Minor injuries	
F		Severe injuries	

24. OPTION A

Now, let's assume that your local authority has resources to implement a violence reduction programme funded by the local community. All residents of the area will pay the same daily fee, and the money collected will be used to finance the security improvements in your area.

However, resources are limited and you are asked to choose which types of crime the programme should try and reduce.

You are asked to **decide** on the following:

	Yes	N0
Resources should be used to reduce injuries described in Scenario B rather than Scenario D?		
Resources should be used to reduce injuries described in Scenario D rather than Scenario F?		
Resources should be used to reduce injuries described in Scenario F rather than Scenario B?		
Resources should be used to reduce injuries described in Scenario A rather than Scenario C?		
Resources should be used to reduce injuries described in Scenario C rather than Scenario E?		
Resources should be used to reduce injuries described in Scenario E rather than Scenario A?		

OPTION B

Now, let's assume that your local authority has resources to implement a violence reduction programme funded by the local community. As the resources are limited you are asked to prioritise the types of crime the programme should try and reduce.

Resources should be used to reduce crimes with resulting injuries as described in:

- Scenario B rather than Scenario D? — Essential — High priority — Medium priority — Low priority — Not a priority
- Scenario D rather than Scenario F? — Essential — High priority — Medium priority — Low priority — Not a priority
- Scenario F rather than Scenario B? — Essential — High priority — Medium priority — Low priority — Not a priority
- Scenario A rather than Scenario C? — Essential — High priority — Medium priority — Low priority — Not a priority
- Scenario C rather than Scenario E? — Essential — High priority — Medium priority — Low priority — Not a priority
- Scenario E rather than Scenario A? — Essential — High priority — Medium priority — Low priority — Not a priority

25. Did you find the previous questions (Q: 13-25) difficult to answer? *(Circle one)*

Not at all difficult | Slightly difficult | Somewhat difficult | Very difficult | Extremely difficult

26. Are you confident in your responses in the previous questions (Q: 13-25)? *(Circle one)*

Not at all confident | Slightly confident | Somewhat confident | Very confident | Extremely confident

2.2.2 Focus group material

Completing the questionnaire: Guidelines and Information

1. The questions are about you and opinion according to your personal experience. There is no right or wrong, good or bad answer. All responses are treated equally and have the same importance weight.

2. Some questions ask whether you would be willing to pay a certain amount of money to avoid an event that is described in each question.

   Willingness to pay (WTP) is the maximum amount a person would be willing to pay, sacrifice or exchange for a good. **By providing your subjective evaluation of situations that involve monetary transactions you help the researcher estimate monetary values for resources and relate the intangible costs as they derive from unpleasant situations to tangible monetary values**.

   – You will be asked (i) how much of your own money you would be willing to pay to avoid an undesirable change or, alternatively, (ii) how much you would ask for as compensation to accept that change.
   – In some cases you will be asked to vote "***for***" or "***against***" a proposal that would require you to pay a certain amount of money.
   – Some questions will ask you to make trade-offs among different alternatives. In those questions you can choose more than one alternatives and rate them according to your preference.

   Remember at all times that any money you agree to spend on crime prevention is your money that could otherwise be used for your own food, clothing or whatever you need.

3. Please try to follow the concept of the study. It is very hard to value a **non-market good** such as violence and some of the questions might be completely new or might even sound stupid to you. When you are asked about willingness to pay or willingness to accept it could possibly help if you think it that way:

   WTA: If you had a car, most people would eventually sell that car if someone offered enough money.
   WTP: Similarly, if you wanted to buy the same car, there is a limit to how much you would be willing to pay for it.

4. The questions on previous victimisation experience will be stored separately to the consent forms and will not be disclosed to anyone else. This information will only be used by the researcher for describing the participants' acquaintances experiences of being a victim of violence.

5. Questions concerning the money spent on entertainment will be used by the researcher for understanding the percentage of the total amount spent for entertainment purposes that corresponds to alcohol consumption. No information that could be used to identify you is required.

The first question illustrates six scenarios that describe a plausible set of **injuries** and **psychological distress** that one can sustain **if assaulted**.

The following points I, II and III correspond to the questions numbered I, II and III respectively.

I.   Imagine that you have the opportunity of paying for a form of protection that **reduces the chances** of you being a victim of violence and therefore suffering injuries described in the scenarios below. We will ask for the **maximum** amount you would pay to reduce the chance of those scenarios from happening to you.

II.   Then, imagine that you find yourself in a situation where it was certain that you would be assaulted and suffer the described consequences. The corresponding question asks the **maximum** amount you would give to "pay yourself out".

III.   Lastly, we will then ask a question where you have the opportunity to accept money in return for suffering injuries. Imagine that a person who has already been assaulted asks to **pay you for swapping places**. In these questions, please try to estimate the **minimum** amount of money you would **accept**.

*** Please note that all questions are hypothetical and the money you are paying out represent how much you VALUE the losses described in the scenarios. Please focus on the emotional consequences of the scenarios rather than the financial losses already covered by taxes or other means.*******

⬥ Scenario A

Physical change	You will sustain **minor facial /head injuries** (e.g. slight scratching, bruising/black eye, other superficial injuries) that will **not** need medical attention **nor** prevent you from your routine activities. However, they will be noticeable by people around you.
Psychological distress	You will experience repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. These symptoms would last for approximately **2 weeks**.

I.   What is the **most** you would pay to prevent the chance of Scenario A from happening to you:
   i.   By **10**%?   £ _____   ii.   By **50**%   £ _____

II.   What is the **most** you would pay to **completely** prevent Scenario A from happening to you?   £ _____

III.   What is the **least** you would **accept** for **enduring** Scenario A?   £ _____

⬥ Scenario B

Physical change	You sustain **serious facial / head injuries** (e.g. broken nose, concussion, internal injuries) that **require** medical care and hospitalisation. They will **not** be life threatening but **will** prevent you from your daily tasks until they heal (e.g. need to take sick leave). Injuries are expected to leave **minor** scaring but **no** long-term disability.
Psychological distress	You will experience nervousness, repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Those symptoms would last for minimum **6 months**.

I.   What is the **most** you would pay to prevent the chance of Scenario B from happening to you:
   i.   By   £ _____   ii.   By **50**%   £ _____

10%?

II. What is the **most** you would pay to **completely** prevent Scenario B from happening to you?   £ _____

III. What is the **least** you would **accept** for **enduring** Scenario B?   £ _____

⬥ Scenario C

Physical change	You sustain **slight torso** injuries (e.g. slight scratching, minor cuts, other superficial injuries) that will **not** need medical attention but **will** be noticeable. They will **not** leave any significant scarring and will **not** prevent your normal activities.
Psychological distress	You will experience repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Those symptoms would last for approximately **2 weeks**.

I. What is the **most** you would pay to prevent the chance of Scenario C from happening to you:
 i. By **10**%?   £ _____   ii. By **50**%   £ _____

II. What is the **most** you would pay to **completely** prevent Scenario C from happening to you?   £ _____

III. What is the **least** you would accept for enduring Scenario C?   £ _____

⬥ Scenario D

Physical change	You sustain **serious torso** injuries (e.g. broken bones, internal injuries) that will **require** medical care and hospitalisation. They will **not** be life threatening but **will** prevent you from your daily routine until they heal (e.g. take sick leave, assistance from others).
Psychological distress	You will experience nervousness, repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Those symptoms would last for minimum **6 months**.

I. What is the **most** you would pay to prevent the chance of Scenario D from happening to you:
 i. By **10**%?   £ _____   ii. By **50**%   £ _____

II. What is the **most** you would pay to **completely** prevent Scenario D from happening to you?   £ _____

III. What is the **least** you would accept for enduring Scenario D?   £ _____

⬥ Scenario E

Physical change	You sustain **slight limb** (legs or arms) injuries (e.g. scratches, cuts, other superficial injuries) that will **not** need medical attention **nor** prevent you from your daily tasks. They will **not** leave any significant scarring but they **will** be noticeable.
Psychological distress	You will experience repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Those symptoms would last for approximately **2 weeks**.

I. What is the **most** you would pay to prevent the chance of Scenario E from happening to you:
 i. By   £ _____   ii. By **50**%   £ _____

10%?

II.   What is the **most** you would pay to **completely** prevent Scenario E from happening to you?   £ _____

III.   What is the **least** you would accept for enduring Scenario E?   £ _____

  ⬇ *Scenario F*

Physical change	You sustain **serious limb** (legs or arms) injuries (e.g. broken bones) that will **require** medical care and hospitalisation. They will **not** be life threatening but **will** prevent you from performing your daily activities until they heal (e.g. need to take sick leave, assistance from others).
Psychological distress	You will experience nervousness, repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Those symptoms would last for minimum **6 months**

I.   What is the **most** you would pay to prevent the chance of Scenario F from happening to you:
   i.   By **10**%?   £ _____   ii.   By **50**%   £ _____

II.   What is the **most** you would pay to **completely** prevent Scenario F from happening to you?   £ _____

III.   What is the **least** you would accept for enduring Scenario F?   £ _____

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SCENARIOS DESCRIPTION OPTION B

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The first set of questions illustrates six scenarios that describe a plausible set of **injuries** and **psychological distress** that one can sustain **if assaulted**.

Please note that all questions are hypothetical and the money you are paying out represent how much you VALUE the losses described in the scenarios. Try to focus on the emotional consequences of the scenarios rather than the financial losses already covered by taxes or other means.

  1.   This question asks your valuations for the harms resulting an assault as described below:

Physical harm	You will sustain **minor facial /head injuries** (e.g. slight scratching, bruising/black eye, other superficial injuries) that will **not** need medical attention **nor** prevent you from your routine activities. However, they will be noticeable by people around you.
Psychological harm	You will experience repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. These symptoms would last for approximately **2 weeks**.

  1.1. Imagine that you have the opportunity of paying for a form of protection that **reduces the chances** of you being assaulted and therefore suffering the harms described above.
  What is the **most** you would pay to prevent the chance of this scenario from happening to you:

  1.1.1.   By **10**%?   £ _____   1.1.2.   By **50**%   £ _____
  1.2. Now imagine that you find yourself in a situation where it was certain that you would be assaulted and suffer the described consequences. The question asks the **maximum** amount you would give to "pay

yourself out". What is the **most** you would pay to **completely** prevent this scenario from happening to you? £ _____

1.3. Now suppose that you have the opportunity to accept money in return for suffering injuries. Imagine that a person who was about to be assaulted would **pay you for swapping places**. What is the **least** amount of money you would want to be paid to experience the above scenario? £ _____

2. This question asks your valuations for the harms resulting an assault as described below:

Physical harm	You sustain **serious facial / head injuries** (e.g. broken nose, concussion, internal injuries) that **require** medical care and hospitalisation. They will **not** be life threatening but **will** prevent you from your daily tasks until they heal (e.g. need to take sick leave). Injuries are expected to leave **minor** scaring but **no** long-term disability.
Psychological harm	You will experience nervousness, repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Those symptoms would last for minimum **6 months**.

2.1. Imagine that you have the opportunity of paying for a form of protection that **reduces the chances** of you being assaulted and therefore suffering the harms described above. What is the **most** you would pay to prevent the chance of this scenario from happening to you:

2.1.1. By **10**%? £ _____ 2.1.2. By **50**% £ _____

2.2. Now imagine that you find yourself in a situation where it was certain that you would be assaulted and suffer the described consequences. The question asks the **maximum** amount you would give to "pay yourself out". What is the **most** you would pay to **completely** prevent this scenario from happening to you? £ _____

2.3. Now suppose that you have the opportunity to accept money in return for suffering injuries. Imagine that a person who was about to be assaulted would **pay you for swapping places**. What is the **least** amount of money you would want to be paid to experience the above scenario? £ _____

3. This question asks your valuations for the harms resulting an assault as described below:

Physical change	You sustain **slight torso** injuries (e.g. slight scratching, minor cuts, other superficial injuries) that will **not** need medical attention but **will** be noticeable. They will **not** leave any significant scarring and will **not** prevent your normal activities.
Psychological distress	You will experience repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Those symptoms would last for approximately **2 weeks**.

3.1. Imagine that you have the opportunity of paying for a form of protection that **reduces the chances** of you being assaulted and therefore suffering the harms described above.
What is the **most** you would pay to prevent the chance of this scenario from happening to you:

3.1.1. By **10**%? £ _____ 3.1.2. By **50**% £ _____

3.2. Now imagine that you find yourself in a situation where it was certain that you would be assaulted and suffer the described consequences. The question asks the **maximum** amount you would give to "pay yourself out". What is the **most** you would pay to **completely** prevent this scenario from happening to you? £ _____

3.3. Now suppose that you have the opportunity to accept money in return for suffering injuries. Imagine that a person who was about to be assaulted would **pay you for swapping places**. What is the **least** amount of money you would want to be paid to experience the above scenario? £ _____

4. This question asks your valuations for the harms resulting an assault as described below:

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Physical change	You sustain **serious torso** injuries (e.g. broken bones, internal injuries) that will **require** medical care and hospitalisation. They will **not** be life threatening but **will** prevent you from your daily routine until they heal (e.g. take sick leave, assistance from others).
Psychological distress	You will experience nervousness, repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Those symptoms would last for minimum **6 months**.

4.1. Imagine that you have the opportunity of paying for a form of protection that **reduces the chances** of you being assaulted and therefore suffering the harms described above. What is the **most** you would pay to prevent the chance of this scenario from happening to you:

4.1.1. By **10**%? £ _____   4.1.2. By **50**% £ _____

4.2. Now imagine that you find yourself in a situation where it was certain that you would be assaulted and suffer the described consequences. The question asks the **maximum** amount you would give to "pay yourself out". What is the **most** you would pay to **completely** prevent this scenario from happening to you? £ _____

4.3. Now suppose that you have the opportunity to accept money in return for suffering injuries. Imagine that a person who was about to be assaulted would **pay you for swapping places**. What is the **least** amount of money you would want to be paid to experience the above scenario? £ _____

5. This question asks your valuations for the harms resulting an assault as described below:

Physical change	You sustain **slight limb** (legs or arms) injuries (e.g. scratches, cuts, other superficial injuries) that will **not** need medical attention **nor** prevent you from your daily tasks. They will **not** leave any significant scarring but they **will** be noticeable.
Psychological distress	You will experience repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Those symptoms would last for approximately **2 weeks**.

5.1. Imagine that you have the opportunity of paying for a form of protection that **reduces the chances** of you being assaulted and therefore suffering the harms described above. What is the **most** you would pay to prevent the chance of this scenario from happening to you:

5.1.1. By **10**%? £ _____   5.1.2. By **50**% £ _____

5.2. Now imagine that you find yourself in a situation where it was certain that you would be assaulted and suffer the described consequences. The question asks the **maximum** amount you would give to "pay yourself out". What is the **most** you would pay to **completely** prevent this scenario from happening to you? £ _____

5.3. Now suppose that you have the opportunity to accept money in return for suffering injuries. Imagine that a person who was about to be assaulted would **pay you for swapping places**.
What is the **least** amount of money you would want to be paid to experience the above scenario? £ _____

6. This question asks your valuations for the harms resulting an assault as described below:

Physical change	You sustain **serious limb** (legs or arms) injuries (e.g. broken bones) that will **require** medical care and hospitalisation. They will **not** be life threatening but **will** prevent you from performing your daily activities until they heal (e.g. need to take sick leave, assistance from others).
Psychological distress	You will experience nervousness, repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Those symptoms would last

for minimum **6 months.**

6.1. Imagine that you have the opportunity of paying for a form of protection that **reduces the chances** of you being assaulted and therefore suffering the harms described above. What is the **most** you would pay to prevent the chance of this scenario from happening to you:

6.1.1. By **10%**? £ _____ 6.1.2. By **50%** £ _____

6.2. Now imagine that you find yourself in a situation where it was certain that you would be assaulted and suffer the described consequences. The question asks the **maximum** amount you would give to "pay yourself out". What is the **most** you would pay to **completely** prevent this scenario from happening to you? £ _____

6.3. Now suppose that you have the opportunity to accept money in return for suffering injuries. Imagine that a person who was about to be assaulted would **pay you for swapping places**.
What is the **least** amount of money you would want to be paid to experience the above scenario? £ _____

*** END OF OPTIONS ***

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1. Now could you please **rank** Scenarios A to F from *1* to *6* in the box below? *Note that **1** stands for your **worst case** scenario.*

Scenario Description	Rank
1.1. You will sustain minor facial /head injuries (e.g. slight scratching, bruising/black eye, other superficial injuries) that will not need medical attention nor prevent you from your routine activities. However, they will be noticeable by people around you. You will experience repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. These symptoms would last for approximately 2 weeks.	
1.2. You sustain serious facial / head injuries (e.g. broken nose, concussion, internal injuries) that require medical care and hospitalisation. They will not be life threatening but will prevent you from your daily tasks until they heal (e.g. need to take sick leave). Injuries are expected to leave minor scaring but no long-term disability. You will experience nervousness, repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Those symptoms would last for minimum 6 months.	
1.3. You sustain slight torso injuries (e.g. slight scratching, minor cuts, other superficial injuries) that will not need medical attention but will be noticeable. They will not leave any significant scarring and will not prevent your normal activities. You will experience repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. These symptoms would last for approximately 2 weeks.	
1.4. You sustain serious torso injuries (e.g. broken bones, internal injuries) that will require medical care and hospitalisation. They will not be life threatening but will prevent you from your daily routine until they heal (e.g. take sick leave, assistance from others). You will experience nervousness, repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Those symptoms would last for	

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minimum 6 months.

1.5. You sustain slight limb (legs or arms) injuries (e.g. scratches, cuts, other superficial injuries) that will not need medical attention nor prevent you from your daily tasks. They will not leave any significant scarring but they will be noticeable.

You will experience repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. These symptoms would last for approximately 2 weeks.

1.6. You sustain serious limb (legs or arms) injuries (e.g. broken bones) that will require medical care and hospitalisation. They will not be life threatening but will prevent you from performing your daily activities until they heal (e.g. need to take sick leave, assistance from others).

You will experience nervousness, repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Those symptoms would last for minimum 6 months.

2. If **any** of those six scenarios could happen to you **tomorrow** and you do not know beforehand which one it would be:

2.1. What is the **most** you would **pay** to **avoid** it? £ [   ]

2.2. How much would you need to **be paid** to **suffer** it? £ [   ]

3. We now want you pretend that you have actually experienced each scenario. **How much** do you think **you would need to spend** coping with? The sort of costs you might want to include are lost income through sick leave, psychotherapist visits, cosmetic surgery, job loss, shopping therapy, holidays, etc. As you answer this question, please consider the emotional and psychological distress caused by each of the scenarios but please do not include medical costs covered the NHS. We are only interested in your personal costs.

Scenario Description   **Money spent to cope (£)**

3.1. You will sustain minor facial /head injuries (e.g. slight scratching, bruising/black eye, other superficial injuries) that will not need medical attention nor prevent you from your routine activities. However, they will be noticeable by people around you.

You will experience repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. These symptoms would last for approximately 2 weeks.

3.2. You sustain serious facial / head injuries (e.g. broken nose, concussion, internal injuries) that require medical care and hospitalisation. They will not be life threatening but will prevent you from your daily tasks until they heal (e.g. need to take sick leave). Injuries are expected to leave minor scaring but no long-term disability.

You will experience nervousness, repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Those symptoms would last for minimum 6 months.

3.3. You sustain slight torso injuries (e.g. slight scratching, minor cuts, other superficial injuries) that will not need medical attention but will be noticeable. They will not leave any significant scarring and will not prevent

your normal activities.

You will experience repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. These symptoms would last for approximately 2 weeks.

> 3.4. You sustain serious torso injuries (e.g. broken bones, internal injuries) that will require medical care and hospitalisation. They will not be life threatening but will prevent you from your daily routine until they heal (e.g. take sick leave, assistance from others).

You will experience nervousness, repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Those symptoms would last for minimum 6 months.

> 3.5. You sustain slight limb (legs or arms) injuries (e.g. scratches, cuts, other superficial injuries) that will not need medical attention nor prevent you from your daily tasks. They will not leave any significant scarring but they will be noticeable.

You will experience repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. These symptoms would last for approximately 2 weeks.

> 3.6. You sustain serious limb (legs or arms) injuries (e.g. broken bones) that will require medical care and hospitalisation. They will not be life threatening but will prevent you from performing your daily activities until they heal (e.g. need to take sick leave, assistance from others).

You will experience nervousness, repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Those symptoms would last for minimum 6 months.

> 4. Now we would like to know your opinion on **how much victims should be paid** in compensation for their pain and suffering for each of the above scenarios.

Scenario Description   **Compensation (£)**

> 4.1. Minor facial /head injuries (e.g. slight scratching, bruising/black eye, other superficial injuries) that do not require medical attention nor prevent from routine activities but would be noticeable by people.

Repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Symptoms would last for approximately 2 weeks.

> 4.2. Serious facial / head injuries (e.g. broken nose, concussion, internal injuries) that require medical care and hospitalisation. Not life threatening but would prevent from daily tasks until they heal. Minor scaring but no long-term disability.

Nervousness, repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Symptoms would last for minimum 6 months.

> 4.3. Slight torso injuries (e.g. slight scratching, minor cuts, other superficial injuries) that do not need medical attention or prevent normal activities. Noticeable but no significant scarring.

Repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Symptoms would last for

approximately 2 weeks.

    4.4. Serious torso injuries (e.g. broken bones, internal injuries) that require medical care and hospitalisation. Not life threatening but would prevent daily routine until they heal.

Nervousness, repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Symptoms would last for minimum 6 months.

    4.5. Slight limb (legs or arms) injuries (e.g. scratches, cuts, other superficial injuries) that will not need medical attention nor prevent from daily tasks. Noticeable but no significant scarring.

Repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Symptoms would last for approximately 2 weeks.

    4.6. Serious limb (legs or arms) injuries (e.g. broken bones) that require medical care and hospitalisation. Not life threatening but would prevent from daily activities until they heal.

Nervousness, repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Symptoms would last for minimum 6 months.

*** END OF SCENARIOS QUESTIONS***

5. Which of the following options best describes where you live?

| Town- City centre | 1 | Suburbs | 2 | Rural | 3 |

6. How often, if at all, do you worry about becoming a victim of violent crime?

| Never | 4 | Just occasionally 3 | Some of the time | 2 | All/most of the time 1 |

7. How safe would you say you feel in your neighbourhood? *Please consider your neighbourhood to be the area within 15-20 minutes walking distance from your home.*

| Very safe | 1 | Safe | 2 | Neither safe nor unsafe | 3 | Unsafe | 4 | Very unsafe | 5 |

8. Do you think that policing is the most effective way to reduce violent crime?

Yes ☐ 1   No ☐ 0   Do not know ☐ 2

9. Imagine that there is a partnership programme to reduce early-evening and late night (non-domestic & non-sexual) violence. This programme has already been shown to work in an area very similar to yours and you have to vote on whether you would like the programme introduced in your area.

How would you vote on the introduction of this programme if it prevented (non-domestic & non-sexual) violent assaults to your community:

  9.1. By **10%**?   For ☐   Against ☐   Do not know ☐
  9.2. By **50%**?   For ☐   Against ☐   Do not know ☐

10. Now suppose that the introduction of this programme into your area will be paid by contributions from the area residents like yourself and **cannot be started** unless a minimum amount of money is raised.

Keeping in mind your current income and what you would give up if you made a contribution, what is the **most** you would pay **per month** to reduce your chance of being assaulted:

  10.1. By **10%**? £ _____   10.2. By **50%** £ _____

11. Imagine that, instead of a regular monthly payment, the programme could be alternatively funded, using indirect ways to raise that money. One option being considered is to ask people pay extra when they go out and socialise.

11.1. What is the **most** you would pay **per evening out** to reduce your chance of being assaulted:

11.1.1. By **10%**? £ _____ 11.1.2. By **50%** £ _____

11.2. Instead of paying per evening out one could pay something extra, on top of the price paid for some social activities, e.g. tickets, food, alcohol etc.

How much EXTRA would you pay **on top of the price you usually pay for your drink (alcoholic or not)** to reduce your chance of being assaulted:

11.2.1. By **10%**? £ _____ 11.2.2. By **50%** £ _____

12. Suppose that the same programme **offered compensation to victims** that were assaulted. Knowing that, how would you vote on its introduction if it also prevented (non-domestic & non-sexual) violent assaults to your community:

12.1. By **10%**? For ☐ Against ☐ Do not know ☐
12.2. By **50%**? For ☐ Against ☐ Do not know ☐

13. Suppose that the programme has been introduced into your area and you were assaulted while out socialising. Would you be willing to accept compensation?

Yes 1 ☐ No ☐ Do not know ☐ 2

14. Suppose that the compensation offered was **based on injury severity**. If you sustained minor injuries then the total amount of money you could ask for in compensation would be significantly lower compared to victims sustaining more severe injuries. Are you **in favour** of **compensation in proportion to injury severity**?

Yes ☐ 1 No ☐ 0 Do not know ☐ 2

15. In your opinion the compensation paid to victims should be in proportion to: *(Select One)*

The upset and inconvenience they suffer? ☐ 1
The physical injuries they sustain? ☐ 2
Both the above? ☐ 3
None of the above? ☐ 4
Do not know ☐ 5
Do not wish to answer ☐ 6

Other (please state) _____

16. Did you find the previous questions (Q: 1-21) difficult to answer?
Not at all difficult │ Slightly difficult │ Somewhat difficult │ Very difficult │ Extremely difficult

17. Are you confident in your responses in the previous questions (Q: 1-21)?
Not at all confident │ Slightly confident │ Somewhat confident │ Very confident │ Extremely confident

18. Have you ever been violently assaulted or attacked while you were outside of your own home or normal place of residence? *Please consider all possible places except your home (e.g. in a pub, in the street, on public transport, at workplace).*

Yes ☐ 1 No ☐ 0 Do not know ☐ 2 Do not wish to answer ☐ 3

19. Has anyone **threatened** to use force or violence on you in any way that actually frightened you while you were outside of your own home or normal place of residence? *Please consider all possible places except your home (e.g. in a pub, in the street, on public transport, at workplace).*

Yes ☐ 1   No ☐ 0   Do not know ☐ 2   Do not wish to answer ☐ 3

20. Have **you** ever been **physically injured** because of a violent assault while you were outside of your own home or normal place of residence? *Please consider all possible places except your home (e.g. in a pub, in the street, on public transport, at workplace). (If NO, skip to Q34)*

Yes ☐ 1   No ☐ 0   Do not know ☐ 2   Do not wish to answer ☐ 3

21. If **Yes**, have you ever needed medical treatment (e.g. from a doctor, a nurse, a dentist, etc.) because of a violent assault? (*Select only one answer*)

Yes ☐ 1   No ☐ 0   Do not know ☐ 2   Do not wish to answer ☐ 3

22. On the last occasion had you personally had any alcohol immediately before the incident took place?

Yes ☐ 1   No ☐ 0   Do not know ☐ 2   Do not wish to answer ☐ 3

23. Do you think that the assailant was under the influence of alcohol at the time it happened?

Yes ☐ 1   No ☐ 0   Do not know ☐ 2   Do not wish to answer ☐ 3

24. Where did the **most recent** assault take place? *(Select one)*

In/around own home (e.g. own garage, immediately outside home)	☐ 1
In or near work place	☐ 2
In public/commercial locations (e.g. public car park)	☐ 3
In/around place of public entertainment (e.g. pub/bar/night club/cinema)	☐ 4
In/around sport related areas (e.g. football ground, sports centre/club)	☐ 5
Travelling on transport or near it	☐ 6
Do not know	☐ 8
Do not wish to answer	☐ 9

Elsewhere (please state) _____ 7

25. Could you please specify the injuries that you sustained **at that time**? *(Select all that apply)*

Type of injuries	FACE/HEAD	TORSO	LIMBS
Superficial injuries (e.g. Scratches/ Cuts, Bruising)			
Significant injuries (e.g. concussion, internal injuries)			
Broken bones (incl. Broken nose or teeth damage)			
Internal injuries			
Other (please specify in the corresponding box)			

26. Taking everything into account, how serious was the incident for you?

Very serious 1 | Fairly serious 2 | Not very serious 3 | Don't know 4

27. Do you regard the incident as a crime?

Yes ☐ 1   No ☐ 0   Do not know ☐ 2   Do not wish to answer ☐ 3

28. Has anyone close to you (family member, friend, acquaintance) ever been physically injured because of a violent assault?

Yes ☐ 1   No ☐ 0   Do not know ☐ 2   Do not wish to answer ☐ 3

29. Do you drink alcohol? *(If NO, skip to Q36)*

Yes ☐ 1   No ☐ 0   Do not wish to answer ☐ 2

30. How much do you pay for **one** of your usual drinks? £ _____

31. **How many** drinks do you usually have in **total** on **a single occasion**? _____

32. Keeping in mind that 1 drink is ½ a pint of beer or 1 glass of wine or 1 single spirits:
– MEN: How **often** do you have **EIGHT or more** drinks on **one** occasion?
– WOMEN: How **often** do you have **SIX or more** drinks on **one** occasion?   *(Select One)*

Never 1 | Less than monthly 2 | Monthly 3 | Weekly 4 | Daily/Almost daily 5

33. How often during the last year have you been unable to remember what happened the night before because you had been drinking? *(Select One)*

Never 1 | Less than monthly 2 | Monthly 3 | Weekly 4 | Daily/Almost daily 5

34. How **often** during the last year have you **failed to do** what was normally expected of you because of drinking? *(Select One)*

Never 1 | Less than monthly 2 | Monthly 3 | Weekly 4 | Daily/Almost daily 5

35. In the last year, has a relative or friend, or a doctor or other health worker been **concerned** about your drinking or **suggested** you cut down? *(Select One)*

No 1 | Yes, on one occasion 2 | Yes, on more than one occasion 3

36. What is your personal total **monthly income** (net income/excl. tax)? £ _____
37. How much do you usually spend **weekly** for **leisure** activities? £ _____

38. Taking all things together, how happy would you say you are?

Extremely unhappy   **Extremely happy**

00   **01**   **02**   **03**   **04**   **05**   **06**   **07**   **08**   **09**   **10**

39. How is your health in general?

Very good 1 | Good 2 | Fair 3 | Bad 4 | Very bad 5 | Varies/Don't know 6

40. You are: Male ☐ 1   Female ☐ 0

41. In what year where you born? _____

42. What is your marital status?

Married | Divorced/Separated | Widowed 3 | Single 4 | Other 5

1		2					

43. Which of the following qualifications do you have?

None	CSE/O'	Apprenticeship	Professional Degree	College or	Higher degree
1	levels/GCSE 2	or A/AS level 3	or Diploma 4	University 5	(Masters, PhD etc.) 6

44. How would you describe your occupational position?

Working 1	Unemployed 2	Keeping home 3	Retired 4	Student 5	Other 6

45. What is your ethnic group?

British or mixed British	1
Irish	2
Any other white background	3
Mixed	4
Asian or Asian British	5
Black or Black British	6
Chinese	7
Any other ethnic group	8

Any comments or thoughts on the questions you have answered that you would like to share?

2.3 Finalised survey instrument: Hard copy

Questionnaire V1.6(25/07/11)

Valuing the personal costs of non-domestic and non-sexual violence
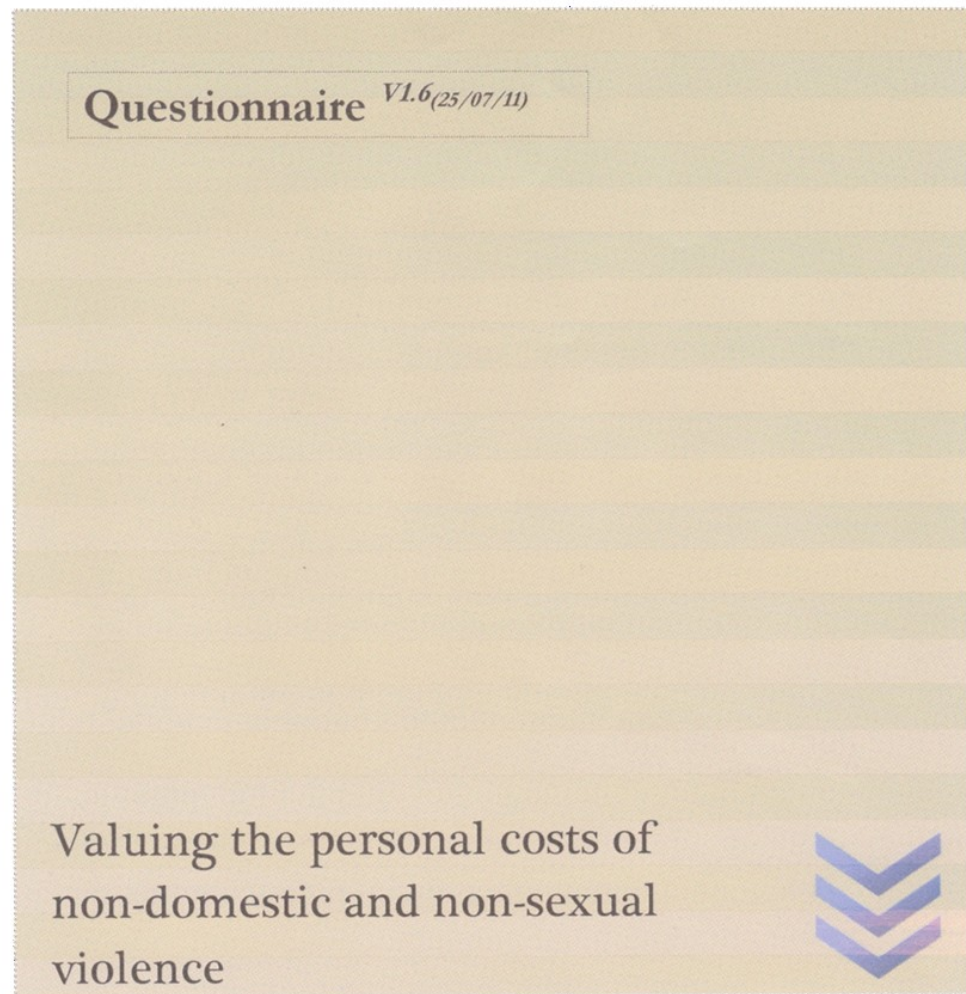
Dear Respondent,

Violence costs our society a great deal of money. It is even more costly though if we think about the fear and the psychological pain and suffering it can cause on each one of us. Victims of violence can find themselves tens of thousands of pounds out-of-pocket and criminal injuries compensation in many cases falls far short of what families have to spend.

What we want to do is find out how much people value the losses from violence and how much they spend to cope with it. This survey asks your thoughts on those issues and your answers will help us describe these personal costs in terms of money.

Many of us would feel it absurd to calculate costs of violence. However, such costs are already being calculated by the Governance and because of the limited resources we have in the personal costs, the numbers ignore our personal evaluation of the many unfavourable consequences of violence. For this reason, even if you think that no number can meaningfully stand for describing those issues please take some time to consider how valuable an effort to do so would be for everyone.

Some of the people who have seen this survey told us that they do not want to pay to reduce violence. It is important to understand that we are not asking you to actually pay, nor suggesting that anyone should pay to reduce violence! Taxes have been paid and so people have already paid for this. What we are asking is how much you think reducing violence is worth. For example, we will ask how much you would pay to avoid being assaulted. This sort of question is one way we can find out about how much you think this assault costs. For most people, a very minor assault, for example a push, is not worth much but a more serious injury, for example a black eye, is probably worth a lot more. By asking these questions we can work out how much people think violence costs in terms of money.

Here is an example to help you picture how this works.

Imagine that you have a car and it gets stolen. To replace that car you would have to pay something if your insurance did not cover everything. If you think about the situation before you car gets stolen and until it is replaced, there are some hidden costs that insurance cannot always cover. For example, you could probably feel a bit miserable about your car being stolen. You could pay something extra to make sure that this will not happen again. You could also have left important things in your car that could not be easily replaced. Or, you might have to use other means of transportation until your new car arrives. All this will be a costly experience, both in terms of money and psychological discomfort. So, there would be a difference between the actual value of your stolen car and what it would mean to you if this happened. This extra money is one way of understanding how much you value the worth of your car in your everyday life. This is a bit similar to what we are trying to do here. To work out how much people value losses from violence and what would it mean in their everyday life.

If you also have any thoughts about this survey there will be space at the end for you to let us know what you think. In the meantime, we would be very grateful if you could try and answer the questions as honestly as you can, even if answering them seems strange. There is no such thing as right or wrong, good or bad answers.

Thank you very much for reading this!

2

The first set of questions illustrates six scenarios that describe a plausible set of **injuries** and **psychological distress** that one can sustain **if assaulted**. Please note that **all questions are hypothetical** and the money you are asked to pay represent how much you **value** the losses described in the scenarios.

Scenario A

Physical harm

Imagine that you are assaulted and suffer **minor** injuries to your **face** and **head** (e.g. slight scratching, bruising/black eye, other superficial injuries). These injuries will **not** need medical attention or prevent you from undertaking your usual activities. However, they will be noticeable by people around you.

Psychological harm

You will experience repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. These symptoms would last for approximately **2 weeks**.

   1. This question asks for the value you would place on the harms described above that result from an assault.

1.1. What is the **most** that you would pay to prevent the chance of this happening to you:

  1.1.1   **By 10%?**   £ _____   1.1.2   **By 50%**   £ _____

1.2. What is the **most** you would pay to **completely** prevent this scenario from happening to you? £_____

1.3. What is the **least** amount of money you would want to be paid to experience this scenario? £_____

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Scenario B

Physical harm

Imagine that you are assaulted and suffer **severe** injuries to your **face** and **head** (e.g. broken nose, concussion, internal injuries) that **require** medical care and hospitalisation. They will **not** be life threatening but **will** prevent you from your daily tasks until they heal (e.g. need to take sick leave). Injuries are expected to leave **minor** scarring but **no** long-term disability.

Psychological harm

You will experience nervousness, repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Those symptoms would last for minimum **6 months**.

2. This question asks for the value you would place on the harms described above that result from an assault.

2.1. What is the **most** that you would pay to prevent the chance of this happening to you:

2.1.1 By **10%**? £ _____ 2.1.2 By **50%** £ _____

2.2. What is the **most** you would pay to **completely** prevent this scenario from happening to you? £ _____

2.3. What is the **least** amount of money you would want to be paid to experience this scenario? £ _____

Scenario C

Physical harm

Imagine that you are assaulted and suffer **slight** injuries to your **torso** (i.e. chest, stomach) (e.g. slight scratching, minor cuts, other superficial injuries) that will **not** need medical attention but **will** be noticeable. They will **not** leave any significant scarring and will **not** prevent your normal activities.

Psychological harm

You will experience repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Those symptoms would last for approximately **2 weeks**.

3. This question asks for the value you would place on the harms described above that result from an assault.

3.1. What is the **most** that you would pay to prevent the chance of this happening to you:

3.1.1 By **10%**? £ _____ 3.1.2 By **50%** £ _____

3.2. What is the **most** you would pay to **completely** prevent this scenario from happening to you? £ _____

3.3. What is the **least** amount of money you would want to be paid to experience this scenario? £ _____

Scenario D

Physical harm

Imagine that you are assaulted and suffer **serious** injuries to your **torso** (i.e. chest, stomach) (e.g. broken bones, internal injuries) that will **require** medical care and hospitalisation. They will **not** be life threatening but **will** prevent you from your daily routine until they heal (e.g. take sick leave, assistance from others).

Psychological harm

You will experience nervousness, repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Those symptoms would last for minimum **6 months**.

4. This question asks for the value you would place on the harms described above that result from an assault.

4.1. What is the **most** that you would pay to prevent the chance of this happening to you:

4.1.1   By **10%**?   £ _____   4.1.2   By **50%**   £ _____

4.2. What is the **most** you would pay to **completely** prevent this scenario from happening to you? £_____

4.3. What is the **least** amount of money you would want to be paid to experience this scenario? £_____

Scenario E

Physical harm

Imagine that you are assaulted and suffer **slight** injuries to your **limbs** (legs or arms) (e.g. scratches, cuts, other superficial injuries) that will **not** need medical attention **nor** prevent you from your daily tasks. They will **not** leave any significant scarring but they **will** be noticeable.

Psychological harm

You will experience repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Those symptoms would last for approximately **2 weeks**.

5. This question asks for the value you would place on the harms described above that result from an assault.

5.1. What is the **most** that you would pay to prevent the chance of this happening to you:

5.1.1   By **10%**?   £ _____   5.1.2   By **50%**   £ _____

5.2. What is the **most** you would pay to **completely** prevent this scenario from happening to you? £_____

5.3. What is the **least** amount of money you would want to be paid to experience this scenario? £_____

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Scenario F

Physical harm

Imagine that you are assaulted and suffer **serious** injuries to your **limbs** (legs or arms) (e.g. broken bones) that will **require** medical care and hospitalisation. They will **not** be life threatening but **will** prevent you from performing your daily activities until they heal (e.g. need to take sick leave, assistance from others).

Psychological harm

You will experience nervousness, repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks. Those symptoms would last for minimum **6 months**.

6. This question asks for the value you would place on the harms described above that result from an assault.

6.1. What is the **most** that you would pay to prevent the chance of this happening to you:

6.1.1   By **10%**?   £ _____   6.1.2   By **50%**   £ _____

6.2. What is the **most** you would pay to **completely** prevent this scenario from happening to you? £ _____

6.3. What is the **least** amount of money you would want to be paid to experience this scenario?
£ _____

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7. We are now going to ask you to rank the scenarios you have just read from 1 to 6, where **1 is the worst case.** Please give each scenario a number from 1 to 6 and use each number only once. *(State your answer in each box)*

Scenario	Description	Rank
A	Minor injuries to the face/head	
B	Severe injuries to the face/head	
C	Minor injuries to the torso	
D	Severe injuries to the torso	
E	Minor injuries to the limbs	
F	Severe injuries to the limbs	

8. We now want you pretend that you have actually experienced the harms described in each scenario.

How much do you think **you would need to spend** coping with each of them?

The sort of costs you might want to include are lost income through sick leave, psychotherapist visits, cosmetic surgery, job loss, shopping therapy, holidays, etc. As you answer this question, please consider the emotional and psychological distress caused by each of the scenarios and do not include medical costs covered the NHS. We are only interested in your personal costs. *(State your answer in each box)*

Scenario	Description	Money spent (£)
A	Minor injuries to the face/head	
B	Severe injuries to the face/head	
C	Minor injuries to the torso	
D	Severe injuries to the torso	
E	Minor injuries to the limbs	
F	Severe injuries to the limbs	

9. Now we would like to know your opinion on **how much victims should be paid** in compensation for their pain and suffering for each of the above scenarios.

(State your answer in each box)

Scenario	Description	Compensation (£)
A	Minor injuries to the face/head	
B	Severe injuries to the face/head	
C	Minor injuries to the torso	
D	Severe injuries to the torso	
E	Minor injuries to the limbs	
F	Severe injuries to the limbs	

10. What do you think is the most important feature to be used when working out how much someone should be compensated? *(Tick only one or state)*

The upset and inconvenience they suffer?
The physical injuries they suffer?
Both the above?
None of the above?
Do not know
Do not wish to answer

Other (please state) _____

11. If **any** of the six scenarios discussed in the previous questions could happen to you **tomorrow** and you do not know beforehand which one it would be:

(State your answer in each box)

11.1. What is the **most** you would **pay** to **avoid** it?   £ [ ]

11.2. How much would you need to **be paid** to **suffer** it?   £ [ ]

The following questions ask your valuations on an imaginary a partnership programme to reduce non-domestic & non-sexual violence in your area. Please answer in the same way of thinking with the previous questions.

12. Do you think that policing is the most effective way to reduce violent crime? *(Tick only one)*

Yes [ ]   No [ ]   Do not know [ ]

13. Imagine that there is a partnership programme to reduce non-domestic & non-sexual violence. This programme has already been shown to work in an area very similar to yours and you have to vote on whether you would like the programme introduced in your area.

How would you vote on the introduction of this programme if it prevented non-domestic & non-sexual violent assaults to your community:

13.1. By **10%**?   *(Tick one)*   For [ ] Against [ ] Do not know [ ]

13.2. By **50%**?   *(Tick one)*   For [ ] Against [ ] Do not know [ ]

14. Suppose that the same programme **offered compensation to victims** that were assaulted. Knowing that, would you change your vote?

Yes [ ]   No [ ]   Do not know [ ]

If YES, why? _____

15. Now suppose that the introduction of this programme into your area will be paid by contributions from the area residents like yourself and **cannot be started** unless a minimum amount of money is raised.

Keeping in mind your current income and what you would give up if you made a contribution:

15.1 What is the **most** you would pay **per month** to reduce non-sexual violent assaults to your community: *(State your answer)*

15.1.1 By **10%**?   £ _____   15.1.2 By **50%**   £ _____

15.2 What is the **most** you would pay **per year** to reduce non-sexual violent assaults to your community: *(State your answer)*

15.2.1 By **10%**?   £ _____   15.2.2 By **50%**   £ _____

16. Did you find the previous questions (Q: 1-15) difficult to answer? *(Circle only one)*

Not at all difficult	Slightly difficult	Somewhat difficult	Very difficult	Extremely difficult

17. Are you confident in your responses in the previous questions (Q: 1-15)? *(Circle only one)*

Not at all confident	Slightly confident	Somewhat confident	Very confident	Extremely confident

The following questions are about you, such as your age and gender, and your personal experience with violence. Answers to these questions will help us understand who completed our survey. No information that could be used to identify you is required.

18. Has anyone **threatened** to use force or violence on you in any way that actually frightened you while you were outside of your own home or normal place of residence? *Please consider all possible places except your home (e.g. in a pub, in the street, on public transport, at workplace).*   *(Tick only one)*

Yes ☐   No ☐   Do not know ☐   Do not wish to answer ☐

19. Have you ever been violently assaulted or attacked while you were outside of your own home or normal place of residence? *Please consider all possible places except your home (e.g. in a pub, in the street, on public transport, at workplace). (If NO, skip to Q20)*   *(Tick only one)*

Yes ☐   No ☐   Do not know ☐   Do not wish to answer ☐
(Continue)   (Skip to Q20)

19.1 In total how many times has this happened? *(Tick only one)*

Once ☐   Twice ☐   Three or more ☐   Do not know ☐   Do not wish to answer ☐

19.2. **In terms of the most recent assault**, how long ago did it happen? *(Tick only one)*

0-6 months ☐   7-12 months ☐   12 + months ☐   Do not know ☐   Do not wish to answer ☐

19.3. At that time, had you personally had any alcohol immediately before the incident took place? *(Tick only one)*

Yes ☐   No ☐   Do not know ☐   Do not wish to answer ☐

19.4. Were you **physically injured** at that time? *(Tick only one) (If NO, skip to Q20)*

Yes ☐   No ☐   Do not know ☐   Do not wish to answer ☐

19.5. Could you please specify the injuries that you sustained **at that time**? *(Tick all that apply or state)*

Type of injuries	Location of Injuries		
	FACE/HEAD	TORSO	LIMBS
Superficial injuries (e.g. Scratches/ Cuts, Bruising)	☐	☐	☐
Significant injuries (e.g. concussion, internal injuries)	☐	☐	☐
Broken bones (incl. Broken nose or teeth damage)	☐	☐	☐
Internal injuries			

Other (please state) _____

19.6. Did you need medical treatment (e.g. from a doctor, a nurse, a dentist, etc.) at that time? *(Tick only one)*

Yes ☐   No ☐   Do not know ☐   Do not wish to answer ☐

19.7. Taking everything into account, how serious was that incident for you? *(Circle only one)*

Very serious | Fairly serious | Not very serious | Do not know | Do not wish to answer

20. Has anyone close to you (family member, friend, acquaintance) ever been physically injured because of a violent assault? *(Tick only one)*

Yes ☐   No ☐   Do not know ☐   Do not wish to answer ☐

21. How often, if at all, do you worry about becoming a victim of violent crime? *(Circle only one)*

Never | Just occasionally | Some of the time | All/most of the time

22. How much do you usually spend **weekly** for **leisure** activities? £ _____

23. Do you drink alcohol? *(if NO, skip to Q27) (Tick only one)*

Yes ☐   No ☐   Do not wish to answer ☐

24. How much do you pay for **one** of your usual alcoholic drinks? £ _____

25. **How many** of your usual alcoholic drinks do you typically have in **total** on a **single occasion**? _____

26. Keeping in mind that 1 drink is ½ a pint of beer or 1 glass of wine or 1 single spirits:

MEN: How **often** do you have **EIGHT or more** drinks on **one** occasion?

WOMEN: How **often** do you have **SIX or more** drinks on **one** occasion?   *(Circle only one)*

| Never | Less than monthly | Monthly | Weekly | Daily/Almost daily |

27. How much money do you personally have each month to cover your **total monthly expenditure** (net income/excl. tax, include all benefits and student loans)?
£ _____

28. Taking all things together, how happy would you say you are? *(Circle only one)*

Extremely unhappy   **Extremely happy**

00   01   02   03   04   05   06   07   08   09   10

29. You are: Male ☐   Female ☐

30. In what year where you born? _____

31. What is your marital status? *(Circle only one)*

| Married | Divorced/Separated | Widowed | Single | Other |

32. Which of the following qualifications do you have? *(Circle only one)*

| None | CSE/O' levels or GCSE | Apprenticeship or A/AS level | Degree or Diploma | Other |

33. How would you describe your occupational status? *(Circle only one)*

| Working | Unemployed | Looking after family or home | Retired | Student | Other |

34. What is your ethnic group? *(Tick only one)*

White
Mixed
Asian or Asian British
Black or Black British
Chinese
Any other ethnic group

35.   Under each heading, please tick the ONE box that best describes your health TODAY

35.1.   MOBILITY

I have no problems in walking about

I have slight problems in walking about

I have moderate problems in walking about

I have severe problems in walking about

I am unable to walk about

35.2.SELF-CARE

I have no problems washing or dressing myself

I have slight problems washing or dressing myself

I have moderate problems washing or dressing myself

I have severe problems washing or dressing myself

I am unable to wash or dress myself

35.3.   USUAL ACTIVITIES *(e.g. work, study, housework, family or leisure activities)*

I have no problems doing my usual activities

I have slight problems doing my usual activities

I have moderate problems doing my usual activities

I have severe problems doing my usual activities

I am unable to do my usual activities

35.4.   PAIN / DISCOMFORT

I have no pain or discomfort

I have slight pain or discomfort

I have moderate pain or discomfort

I have severe pain or discomfort

I have extreme pain or discomfort

35.5.   ANXIETY / DEPRESSION

I am not anxious or depressed

I am slightly anxious or depressed

I am moderately anxious or depressed

I am severely anxious or depressed

I am extremely anxious or depressed

35.6. We would like to know how good or bad your health is TODAY.

This scale is numbered from 0 to 100.

100 means the best health you can imagine.

0 means the worst health you can imagine.

Mark an X on the scale to indicate how your health is TODAY.

Now, please write the number you marked on the scale in the box below

YOUR HEALTH TODAY =

The best health you can imagine

100

95

90

85

80

75

70

65

60

55

50

45

40

35

30

25

20

25

10

5

0
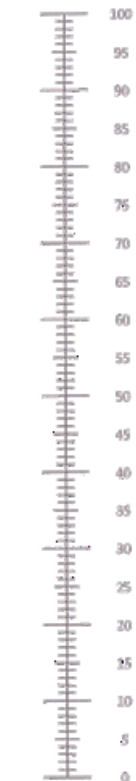
The worst health you can imagine

Any comments or thoughts on the questions you have answered that you would like to share?

Thank you very much for participating in this research

If you have any questions or would like more information please email
mylonak@cardiff.ac.uk or phone: **+44 (0)29 2074 4246.**

2.4 Finalised survey instrument: Online version (Screenshots of the web application)

Cost Survey T

Welcome and hello,

Thank you very much for your interest in participating in this research!

** Privacy Statement **

1. Data Protection
For the purposes of this survey Cardiff University is the data controller. All data collected in this survey will be held securely by the survey software provider (Bristol University) under contract and then retained by Cardiff University in accordance with the Data Protection Act (1998).

2. Personal Information
All data from the survey will be treated in confidence. Please read the *Participant Information Sheet* for more information.

3. Use of Cookies
Cookies, personal data stored by your Web browser, are not used in this survey.

Please make sure that you read the *Participant Information Sheet* before completing the survey!

Continue >

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Dear Participant,

We are interested in your thoughts and opinions on violence. Even if you have not experienced violence in any way, we are still interested in your opinion.

We are researching the cost of violence, and in particular, the pain, fear and suffering that people have experienced or might experience.

We want to try to find a way of *describing* these personal costs in terms of money.

If we can find a way of describing the costs of violence in terms of money it means that we can compare violent crime with other crimes, such as car theft where there are easier ways to understand the *value* of *victims' losses*.

In this survey there are questions that ask you how much you would pay to, for example, reduce your chance of being a victim of violence.

We are not suggesting that anyone should pay to reduce violence. What we are trying to do is to find a way for people to value those chances in terms of money.

When we tried this questionnaire out with a few people, we were told that they do not want to pay to reduce violence, and they did not answer our questions!
But we are **not** asking people to pay, but are asking what a reduction in violence **is worth**.
When we explained this to them they were able to answer all of our questions.

If you also have any thoughts about this survey, there will be space at the end for you to let us know what you think.
In the meantime, we would be very grateful if you could try and answer the questions as honestly as you can. Even if answering them seems strange, please try.

There are no right or wrong, good or bad answers. Your answers will be treated in strict confidence and we are not collecting any information that can be used to identify you.

Continue >

396

Cost Survey T

Part I: "Scenarios A-F"

In this first set of questions, six scenarios describe plausible **injuries** and **psychological distresses** that one can sustain **if assaulted**.

Please note that **all questions are hypothetical** and the money you are asked to pay represent how much **you** *value* **the losses** described in the scenarios.

Scenario A

Physical harm
Imagine that you are assaulted and suffer **minor** injuries to your **face** and **head** (e.g. slight scratching, bruising/black eye, other superficial injuries).
These injuries will **not** need medical attention or prevent you from undertaking your usual activities. However, they **will** be noticeable by people around you.

Psychological harm
You will experience repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks.
These symptoms would last for approximately **2 weeks**.

1. This question asks for the value you would place on the harms described above that result from an assault.   [More Info]

	Please type in the box the **amount of money (£)** that answer each question.
a. What is the **most** that you would pay to **prevent** the chance of this happening to you by **10%**?	
b. What is the **most** that you would pay to **prevent** the chance of this happening to you by **50%**?	
c. What is the **most** you would pay to **completely prevent** this scenario from happening to you?	
d. What is the **least** amount of money you would want to **be paid** to **experience** this scenario?	

Scenario B

Physical harm
Imagine that you are assaulted and suffer **severe** injuries to your **face** and **head** (e.g. broken nose, concussion, internal injuries) that **require** medical care and hospitalisation. They will **not** be life threatening but **will** prevent you from your daily tasks until they heal (e.g. need to take sick leave). Injuries are expected to leave **minor** scaring but **no** long-term disability.

Psychological harm
You will experience nervousness, repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks.
Those symptoms would last for minimum **6 months**.

2. This question asks for the value you would place on the harms described above that result from an assault.   [More Info]

	Please type in the box the **amount of money (£)** that answer each question.
a. What is the **most** that you would pay to **prevent** the chance of this happening to you by **10%**?	
b. What is the **most** that you would pay to **prevent** the chance of this happening to you by **50%**?	
c. What is the **most** you would pay to **completely prevent** this scenario from happening to you?	
d. What is the **least** amount of money you would want to **be paid** to **experience** this scenario?	

Scenario C

Physical harm
Imagine that you are assaulted and suffer **slight** injuries to your **torso** (i.e. chest, stomach) (e.g. slight scratching, minor cuts, other superficial injuries) that will **not** need medical attention but **will** be noticeable. They will **not** leave any significant scarring and will **not** prevent your normal activities.

Psychological harm
You will experience repeated recollections of the assault, difficulty falling or staying asleep (1- 2 nights per week) and difficulty concentrating on daily tasks.
Those symptoms would last for approximately **2 weeks**.

3. This question asks for the value you would place on the harms described above that result from an assault.   [More Info]

	Please type in the box the **amount of money (£)** that answer each question.
a. What is the **most** that you would pay to **prevent** the chance of this happening to you by **10%**?	
b. What is the **most** that you would pay to **prevent** the chance of this happening to you by **50%**?	
c. What is the **most** you would pay to **completely prevent** this scenario from happening to you?	
d. What is the **least** amount of money you would want to **be paid** to **experience** this scenario?	

Scenario D

Physical harm
Imagine that you are assaulted and suffer **serious** injuries to your **torso** (i.e. chest, stomach) (e.g. broken bones, internal injuries) that will **require** medical care and hospitalisation. They will **not** be life threatening but **will** prevent you from your daily routine until they heal (e.g. take sick leave, assistance from others).

Psychological harm
You will experience nervousness, repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks.
Those symptoms would last for minimum **6 months**.

4. This question asks for the value you would place on the harms described above that result from an assault.   [More Info]

	Please type in the box the **amount of money (£)** that answer each question.
a. What is the **most** that you would pay to **prevent** the chance of this happening to you by **10%**?	
b. What is the **most** that you would pay to **prevent** the chance of this happening to you by **50%**?	
c. What is the **most** you would pay to **completely prevent** this scenario from happening to you?	
d. What is the **least** amount of money you would want to **be paid** to **experience** this scenario?	

Scenario E

Physical harm
Imagine that you are assaulted and suffer **slight** injuries to your **limbs** (legs or arms) (e.g. scratches, cuts, other superficial injuries) that will **not** need medical attention **nor** prevent you from your daily tasks. They will not leave any significant scarring but they **will** be noticeable.

Psychological harm
You will experience repeated recollections of the assault, difficulty falling or staying asleep (1- 2 nights per week) and difficulty concentrating on daily tasks.
Those symptoms would last for approximately **2 weeks**.

5. This question asks for the value you would place on the harms described above that result from an assault.   [More Info]

	Please type in the box the **amount of money (£)** that answer each question.
a. What is the **most** that you would pay to **prevent** the chance of this happening to you by **10%**?	
b. What is the **most** that you would pay to **prevent** the chance of this happening to you by **50%**?	
c. What is the **most** you would pay to **completely prevent** this scenario from happening to you?	
d. What is the **least** amount of money you would want to **be paid** to **experience** this scenario?	

Scenario F

Physical harm
Imagine that you are assaulted and suffer **serious** injuries to your **limbs** (legs or arms) (e.g. broken bones) that **will require** medical care and hospitalisation. They will **not** be life threatening but **will** prevent you from performing your daily activities until they heal (e.g. need to take sick leave, assistance from others).

Psychological harm
You will experience nervousness, repeated recollections of the assault, difficulty falling or staying asleep (1-2 nights per week) and difficulty concentrating on daily tasks.
Those symptoms would last for minimum **6 months**.

6. This question asks for the value you would place on the harms described above that result from an assault.   [More Info]

	Please type in the box the **amount of money (£)** that answer each question.
a. What is the **most** that you would pay to **prevent** the chance of this happening to you by **10%**?	
b. What is the **most** that you would pay to **prevent** the chance of this happening to you by **50%**?	
c. What is the **most** you would pay to **completely prevent** this scenario from happening to you?	
d. What is the **least** amount of money you would want to **be paid** to **experience** this scenario?	

---

7. We are now going to ask you to **rank** the scenarios you have just read from 1 to 6, where **1** is the **worst case**.
Please give each scenario a number from 1 to 6 and use each number only once.   [More Info]

	Rank
a. Scenario A: **Minor** injuries to the **face/head**	Select an answer ▼
b. Scenario B: **Severe** injuries to the **face/head**	Select an answer ▼
c. Scenario C: **Minor** injuries to the **torso**	Select an answer ▼
d. Scenario D: **Severe** injuries to the **torso**	Select an answer ▼
e. Scenario E: **Minor** injuries to the **limbs**	Select an answer ▼
f. Scenario F: **Severe** injuries to the **limbs**	Select an answer ▼

8. If **any** of the six scenarios discussed in the previous questions could happen to you **tomorrow** and you do **not know** beforehand which one it would be: [More Info]

	Please type in the box the **amount of money (£)** that answer each question.
a. What is the **most** you would pay to **avoid** it?	
b. How much would you need to **be paid** to **suffer** it?	

9. We now want you pretend that you have actually experienced the harms described in each scenario.   [More Info]

How much do you think you **would need to spend** coping with each of them?

The sort of costs you might want to include are lost income through sick leave, psychotherapist visits, cosmetic surgery, job loss, shopping therapy, holidays, etc.

As you answer this question, please consider the emotional and psychological distress caused by each of the scenarios and do not include medical costs covered the NHS. We are only interested in your personal costs.

	Please type in the box the **amount of money (£)** that answer each question.
a. Scenario A: **Minor** injuries to the **face/head**	
b. Scenario B: **Severe** injuries to the **face/head**	
c. Scenario C: **Minor** injuries to the **torso**	
d. Scenario D: **Severe** injuries to the **torso**	
e. Scenario E: **Minor** injuries to the **limbs**	
f. Scenario F: **Severe** injuries to the **limbs**	

10. Now we would like to know your opinion on **how much victims should be paid** in compensation for their pain and suffering for each of the above scenarios.   [More Info]

	Please type in the box the **amount of money (£)** that answer each question.
a. Scenario A: **Minor** injuries to the **face/head**	
b. Scenario B: **Severe** injuries to the **face/head**	
c. Scenario C: **Minor** injuries to the **torso**	
d. Scenario D: **Severe** injuries to the **torso**	
e. Scenario E: **Minor** injuries to the **limbs**	
f. Scenario F: **Severe** injuries to the **limbs**	

11. What do you think is the most important feature to be used when working out how much someone should be compensated?   [More Info]

○ The upset and inconvenience they suffer?
○ The physical injuries they suffer?
○ Both the above?
○ None of the above?
○ Do not know
○ Do not wish to answer
○ Other (please specify):

[text box]

[Continue >]

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Part II "Victimisation Prevention Programme"

The following questions ask you to value an imaginary a partnership programme that reduces non-domestic & non-sexual violence in your area.

12. Do you think that policing is the most effective way to reduce violent crime?　　　　　More Info

- ○ Yes
- ○ No
- ○ Do not know

13. Imagine that there is a partnership programme to reduce non-domestic & non- sexual violence.
This programme has already been shown to work in an area very similar to yours and you have to vote on whether you would like the programme introduced in your area.

How would you vote on the introduction of this programme if it prevented non-domestic & non-sexual violent assaults to your community:

	For	Against	Do not know
a. By 10%?	○	○	○
b. By 50%?	○	○	○

14. Suppose that the same programme **offered compensation to victims** that were assaulted.
Knowing that, would you change your vote?

○ Yes ○ No ○ Do not know
If YES, why? *(Optional)*

15. Now suppose that the introduction of this programme into your area will be paid by contributions from residents in the local neighbourhood, such as yourself, but that **it will not start** unless a minimum amount of money is raised.　　More Info

Keeping in mind your current income and what you would give up if you made a contribution:

What is the **most** you would pay **per month** to reduce non-sexual violent assaults in your community:

	Please type in the box the **amount of money (£)** that answer each question.
a. By 10%?	
b. By 50%?	

16. What is the **most** you would pay **per year** to reduce non-sexual violent assaults in your community:

	Please type in the box the **amount of money (£)** that answer each question.
a. By 10%?	
b. By 50%?	

17. Did you find the previous questions (Q: 1-16) difficult to answer?　　More Info

- ○ Not at all difficult
- ○ Slightly difficult
- ○ Somewhat difficult
- ○ Very difficult
- ○ Extremely difficult

18. Are you confident in your responses in the previous questions (Q: 1-16)?

- ○ Not at all confident
- ○ Slightly confident
- ○ Somewhat confident
- ○ Very confident
- ○ Extremely confident

Continue >

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Part III "Experience Questions"

The following questions are about your personal experiences. Some questions ask about previous experience with violence and some about alcohol consumption.

Answers to these questions will help us understand who completed our survey and no information that could be used to identify you is required.

19. Has anyone **threatened** to use force or violence on you in any way that actually frightened you while you were outside of your own home or normal place of residence?
Please consider all possible places except your home (e.g. in a pub, in the street, on public transport, at workplace).

- ○ Yes
- ○ No
- ○ Do not know
- ○ Do not wish to answer

20. Have you ever been **violently assaulted** or **attacked** while you were outside of your own home or normal place of residence?
Please consider all possible places except your home (e.g. in a pub, in the street, on public transport, at workplace).
If NO skip to Q21

- ○ Yes
- ○ No
- ○ Do not know
- ○ Do not wish to answer
  - **a.** In total how many times has this happened?
    - ○ Once
    - ○ Twice
    - ○ Three or more
    - ○ Do not know
    - ○ Do not wish to answer
  - **b.** In terms of **the most recent assault**, how long ago did it happen?
    - ○ 0-6 months
    - ○ 7-12 months
    - ○ 12 + months
    - ○ Do not know
    - ○ Do not wish to answer
  - **c.** At that time, had you personally had any alcohol **immediately before** the incident took place?
    - ○ Yes
    - ○ No
    - ○ Do not know
    - ○ Do not wish to answer
  - **d.** Were you **physically injured** at that time?
    - ○ Yes
    - ○ No
    - ○ Do not know
    - ○ Do not wish to answer
      - **i.** Did you need medical treatment (e.g. from a doctor, a nurse, a dentist, etc.) at that time?
        - ○ Yes ○ No ○ Do not know ○ Do not wish to answer

ii. Could you please specify the injuries that you sustained at that time?
(select all that apply)

☐ Head: Superficial injuries (e.g. scratches, cuts, bruising)
☐ Head:Significant injuries (e.g. concussion, internal injuries)
☐ Head: Broken bones (e.g. broken nose, teeth damage)
☐ Head: Internal injuries
☐ Torso: Superficial injuries (e.g. scratches, cuts, bruising)
☐ Torso:Significant injuries (e.g. internal injuries)
☐ Torso: Broken bones
☐ Torso: Internal injuries
☐ Limbs: Superficial injuries (e.g. scratches, cuts, bruising)
☐ Limbs: Other significant injuries
☐ Limbs: Broken bones
☐ Other *(please specify):*
_____

iii. Taking everything into account, how serious was that incident for you?

○ Very serious
○ Fairly serious
○ Not very serious
○ Do not know
○ Do not wish to answer

21. Has anyone close to you (family member, friend, acquaintance) ever been physically injured because of a violent assault?

○ Yes
○ No
○ Do not know
○ Do not wish to answer

22. How often, if at all, do you worry about becoming a victim of violent crime?

○ Never
○ Just occasionally
○ Some of the time
○ All/most of the time

23. Do you drink alcohol? *If NO skip to Q24*

○ Yes
○ No
○ Do not wish to answer

   a. How much do you pay for **one** of your usual alcoholic drinks?
   [Select an answer ▾]

   b. How many of your usual alcoholic drinks do you typically have in **total** on **a single occasion**?
   [Select an answer ▾]

   c. Keeping in mind that 1 drink is 1/2 a pint of beer or 1 glass of wine or 1 single spirits:

   MEN: How **often** do you have **EIGHT or more** drinks on **one** occasion?

   WOMEN: How **often** do you have **SIX or more** drinks on **one** occasion?

   ○ Never
   ○ Less than monthly
   ○ Monthly
   ○ Weekly
   ○ Daily/Almost daily

24. To the nearest pound, how much do you usually spend **weekly** for leisure activities?
_____

[Continue >]

Cost Survey T

Part IV "Demographics"

This is the last part of our survey and the questions are about you, such as your age and gender.
Answers to these questions will help us understand who completed our survey.
No information that could be used to identify you is required.

25. To the nearest pound, how much do you personally have each month to cover your **total monthly expenditure** (net income/excl. tax, include all benefits and student loans)?
_____

26. Taking all things together, how happy would you say you are?

○ 00 (Extremely unhappy) ○ 01 ○ 02 ○ 03 ○ 04 ○ 05 ○ 06 ○ 07 ○ 08 ○ 09 ○ 10 (Extremely happy)

27. Are you...?

○ Male
○ Female

28. In what year where you born?

[Select an answer ▾]

29. What is your marital status?

○ Married
○ Divorced/Separated
○ Widowed
○ Single
○ Other

30. Which of the following qualifications do you have?

○ None
○ CSE/O' levels or GCSE
○ Apprenticeship or A/AS level
○ University Degree or Diploma (e.g. HND, BSc, MSc)
○ Other

31. How would you describe your occupational status?

- ○ Working
- ○ Unemployed
- ○ Looking after home/family
- ○ Retired
- ○ Student
- ○ Other

32. What is your ethnic group?

- ○ White
- ○ Mixed
- ○ Asian or Asian British
- ○ Black or Black British
- ○ Chinese
- ○ Any other ethnic group

Under each heading, please tick the ONE box that best describes your health TODAY

33. MOBILITY

- ○ I have no problems in walking about
- ○ I have slight problems in walking about
- ○ I have moderate problems in walking about
- ○ I have severe problems in walking about
- ○ I am unable to walk about

34. SELF-CARE

- ○ I have no problems washing or dressing myself
- ○ I have slight problems washing or dressing myself
- ○ I have moderate problems washing or dressing myself
- ○ I have severe problems washing or dressing myself
- ○ I am unable to wash or dress myself

35. USUAL ACTIVITIES (e.g. work, study, housework, family or leisure activities)

- ○ I have no problems doing my usual activities
- ○ I have slight problems doing my usual activities
- ○ I have moderate problems doing my usual activities
- ○ I have severe problems doing my usual activities
- ○ I am unable to do my usual activities

36. PAIN / DISCOMFORT

- ○ I have no pain or discomfort
- ○ I have slight pain or discomfort
- ○ I have moderate pain or discomfort
- ○ I have severe pain or discomfort
- ○ I have extreme pain or discomfort

37. ANXIETY / DEPRESSION

- ○ I am not anxious or depressed
- ○ I am slightly anxious or depressed
- ○ I am moderately anxious or depressed
- ○ I am severely anxious or depressed
- ○ I am extremely anxious or depressed

38. We would like to know how good or bad your health is TODAY.
This scale is numbered from 0 to 100.
100 means the best health you can imagine. 0 means the worst health you can imagine.
Mark an X on the scale to indicate how your health is TODAY.
Now, please write the number you marked on the scale in the box below

YOUR HEALTH TODAY =

[Continue >]

Survey testing only
[Check Answers & Continue >]

The best health
you can imagine

```
— 100
— 95
— 90
— 85
— 80
— 75
— 70
— 65
— 60
— 55
— 50
— 45
— 40
— 35
— 30
— 25
— 20
— 15
— 10
— 5
— 0
```

The worst health
you can imagine

Cost Survey T

Your comments

This is the end of the survey! In this page there is space for you to leave any comments and thoughts you might have on the questions.
All your comments will be invaluable to the researchers and will add to the understanding of your answers.

39. Any comments or thoughts on the questions you have answered that you would like to share? *(Optional)*

40. Would you like to enter the prize draw for the chance to win £50 book vouchers? *(Optional)*   [More Info]

    ○ Yes ○ No
    If Yes, please enter your e-mail address here:

41. If you are happy to be contacted by e-mail in the future with details of further research studies which may interest you, then please enter your email address here: *(Optional)*   [More Info]

[Continue >]

Cost Survey T

Last page

Thank you very much for participating in this research.

Your answers are now submitted.

If you have any queries about this survey or want more information, please contact **Semele Mylona** (*mylonak@cardiff.ac.uk*) or **Dr Simon Moore** (*+44 (0)29 2074 4245*).

Appendix 3: Complementary material for Chapter 6

3.1 Screening questions & results in the Community Safety Module in the AskCardiff Survey carried out in July 2011

17. How often, if at all, do you worry about becoming a victim of violent crime? (Select only one answer)

216 (24.8%)   Never   214 (24.6%)   Some of the time   36 (4.1%)   Do not wish to answer/Do not know   375 (43.1%) Just occasionally   30 (3.4%)   All/most of the time

18. Have you ever been assaulted while you were outside of your own home or normal place of residence? Please consider all possible places except your home (e.g. in a pub, in the street, on public transport, at workplace). (Select only one answer)

105 (12.2%)   Yes   741 (85.8%)   No   12 (1.4%)   Don't know   6 (0.7%)   Do not wish to answer

19. Have you ever needed medical treatment (e.g. from a doctor, a nurse, a dentist, etc.) because of a violent assault? (Select only one answer)

32 (30.8%)   Yes   67 (64.4%)   No   0 (0.0%)   Don't know   5 (4.8%)   Do not wish to answer

20. Has anyone close to you (family member, friend, acquaintance) ever been physically injured because of a violent assault? (Select only one answer)

256 (29.8%)   Yes   541 (63.1%)   No   48 (5.6%)   Don't know   13 (1.5%)   Do not wish to answer

21. Victims do sometimes receive compensation; in your opinion the compensation paid to victims should be in proportion to: (Select only one answer)

91 (10.7%)   The upset and inconvenience they suffer
213 (25.0%)   The physical injuries they sustain
451 (52.9%)   Both the above
13 (1.5%)   None of the above
20 (2.3%)   I do not think victims should receive compensation
33 (3.9%)   Do not know
22 (2.6%)   Do not wish to answer

10 (1.2%)   Other

As a part of their research the Violence & Society Research Group are looking for volunteers to complete a further survey. The survey takes about 15 minutes to complete and you will be able to withdraw at any time without penalty. In return, we offer the chance to win vouchers worth £50. The questionnaires are available both on-line and on paper and you can choose which method you prefer. Would you be interested in volunteering and being involved in future research? If you answer yes then the AskCardiff survey team will pass on your contact details (collected at the end of the survey) and the answers you gave to questions concerning your age, sex, and nationality.

22. I would like to participate in further research...
319 (38.5%)   Yes   509 (61.5%)   No

23. If you would prefer to compete the survey online and have an email address please enter your address here:
161 (100.0%)

3.2 Survey material and communications for the main survey

3.2.1 Invitation Letter (Post)

School of Dentistry / Yr Ysgol Ddeintyddiaeth
Violence & Society Research Group

CARDIFF
UNIVERSITY

PRIFYSGOL
CAERDYⱭD

October 2011

Dear Participant,

You have recently indicated your interest in the AskCardiff survey in participating in further research conducted by the Violence & Society Research Group[1] (VSRG).

We would like to take this opportunity and ask you to fill out a survey that investigates the emotional costs of violence. The survey is web-based, user-friendly and it will take 15-20 minutes to complete. The survey is **anonymous** and there will be a prize draw of £100 and £50 vouchers for three lucky participants!

The goal of the project is to reveal violence costs that cannot be assigned to typical expenditures (such as medical treatment) but to self-assessed criteria (such as pain and suffering). So far, we can only assume that there are personal and emotional costs that relate to violence but there is not enough hard evidence to support that, and that is why we need your help. This is a novel research for the United Kingdom and the outputs will prove invaluable to us in gaining a real sense of how to address this complex issue.

Previous experience with violence/violent crime is not prerequisite for participating in the survey, as all replies are equally important.

For more information, and to participate in the research please click the following link to the survey or copy and paste it into your web browser:

https://www.surveys.cardiff.ac.uk/viocost/   or   http://tiny.cc/viocost

If you have any queries regarding the above or the VSRG please do not hesitate to get in touch.

Thank you for taking the time to read this.

Best wishes,

Katherine Mylona
V&SRG coordinator

Cardiff University
Violence and Society Research Group
Cardiff School of Dentistry, CF14 4XY
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[1] The Violence & Society Research Group (VSRG) is a Cardiff University multidisciplinary research programme studying violence and its causes. The VSRG aims to implement research findings to improve violence prevention, services for the injured, health promotion, social policy in relation to problems of substance abuse, and drug and alcohol treatment programmes. For more information about the VSRG please visit www.vrg.cf.ac.uk.

3.2.2 Invitation Letter (E-mail)

Dear Participant,

You have recently indicated your interest in the AskCardiff survey in participating in further research conducted by the Violence & Society Research Group[1] (VSRG).

We would like to take this opportunity and ask you to fill out a survey that investigates the emotional costs of violence. The survey is web-based, user-friendly and it will take 15-20 minutes to complete. The survey is **anonymous** and there will be a prize draw of £100 and £50 vouchers for three lucky participants!

The goal of the project is to reveal violence costs that cannot be assigned to typical expenditures (such as medical treatment) but to self-assessed criteria (such as pain and suffering). So far, we can only assume that there are personal and emotional costs that relate to violence but there is not enough hard evidence to support that, and that is why we need your help. This is a novel research for the United Kingdom and the outputs will prove invaluable to us in gaining a real sense of how to address this complex issue.

Previous experience with violence/violent crime is not prerequisite for participating in the survey, as all replies are equally important.

For more information, and to participate in the research please click the following link to the survey or copy and paste it into your web browser:

  https://www.surveys.cardiff.ac.uk/viocost/   or   http://tiny.cc/viocost

If you have any queries regarding the above or the VSRG please do not hesitate to get in touch.

Thank you for taking the time to read this.

Best wishes,

Katherine Mylona
V&SRG coordinator

Cardiff University
Violence and Society Research Group
Cardiff School of Dentistry, CF14 4XY
Heath Park, Cardiff

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3.2.3 Participant Information Sheet

PARTICIPANT INFORMATION SHEET	V1.6

Study title: "The cost of violence: Valuing the personal costs of non-domestic and non-sexual violence"

You are being invited to take part in a research study, which investigates costs of violence. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. Take time to decide whether or not you wish to take part. Thank you for reading this.

1. What is the study about?

This study looks at identifying hidden costs of violence. Hidden costs may include anything each one of us may identify as a way to treat the feelings of pain and suffering left after experiencing violence. Victims of violence can find themselves tens of thousands of pounds out-of-pocket, payable not for the typical expenditures (e.g. medical treatment) but for their own support and comfort (e.g. private counselling). However, there is not enough hard evidence to support that, and that is why we need your help. Your opinion will help us improve our understanding of violence while letting us approach this complex issue from your point of view.

2. Why have I been chosen?

You have been randomly selected from a database of patients who visited the Cardiff Emergency Unit over the past 12 months and based on no other criteria.

3. Do I have to take part?

It is up to you to decide whether or not to take part. If you decide to take part, you can withdraw at anytime without giving a reason. Your decision to participate or not will not affect your future care in any way.

4. What about confidentiality?

The survey is anonymous and we do not require any information that can be used to identify you. You will not be asked to provide personal information such as your name, address or anything that can relate you to the study. Anything related to the information you provide will be treated in confidence. If we publish anything from this study, it will not be possible to identify your input.

5. What do I have to do?

The only thing we ask you to do is to complete this questionnaire, which should take no longer than 20 minutes. In most cases, you will only have to type a number or tick one box. Then, post the completed questionnaire back to us using the reply pre-paid envelope.

6. Are there any risks?

There are no personal risks or deliberately misleading questions involved in this study. No realistic risk of experiencing either physical or psychological distress or discomfort during the completion of the questionnaire is expected. If you feel uncomfortable answering any question please leave it blank or tick the "don't know/refused" option where available. If by any means you feel upset as a result of completing the questionnaire, please contact us immediately. Alternatively, victim support services here in Cardiff are also available for further assistance.

Cardiff (Wales) **Contact Details:** Drake House, Drake Walk Atlantic Wharf, Cardiff, CF10 4AN
Victim Support **Telephone:** 08456 121 900
Telephone (Cardiff) : 02920 464585
Website: www.victimsupport.org.uk

7. What will happen to the results of the research study?

You will not be contacted at the end of the study to be informed of the results unless you want to. Since no personal records will be kept, should you wish to receive more information on the results of the survey, please contact directly any of the researchers below at anytime.

Dr. Simon C. Moore	**Email:** moores2@cardiff.ac.uk
	Telephone: +44 (0)29 2074 4246
Semele-Katherine Mylona	**Email:** mylonak@cardiff.ac.uk
Dr. Vaseekaran Sivarajasingam	**Email:** sivarajasingam@cardiff.ac.uk
	Telephone: +44 (0)29 2074 2441

3.3 Individual level analysis before aggregating: sample outliers

The final dataset recorded 36 observations as 'protests' (outliers) based on the selected criteria. The Table below shows the profiles and the numbers of those outliers that were later excluded in the analysis.

Variable		Mean	SD	Min	Max
Age	36	26.583	10.818	19	70
Sex	36	.4166	.5	0	1
Marital status	36	3.888	.949	1	5
Education	36	3.472	.696	1	4
Occupational status	36	3.916	1.729	1	5
Ethnicity	36	1.694	1.431	1	6
Average monthly income	36	616.583	727.139	0	3100
Appendix AVictims of violent crime	36	.333	.755	0	4
Times of victimisation	8	2	.925	1	3
Appendix BWorried about crime	36	2.166667	.654	1	3
Policing: the most effective way to reduce violent crime	36	1.027	1.230	0	3
Alcohol consumers	36	.722	.454	0	1
Average leisure spending per month	36	48.861	46.735	5	250
Average spending on alcohol per occasion	26	15.957	10.727	4	50
M-SASQ	26	2.615	1.061	1	4
Happiness score	36	7.027	2.197	0	10
Mobility	36	1.166	.609	1	4
Self-care	36	1.055	.333	1	3
Usual activities	36	1.138	.592	1	4
Pain	36	1.333	.676	1	4
Anxiety	36	1.611	.728	1	3
VAS	36	81.944	14.839	40	100
Questions difficult to answer	36	2.751	1.180	1	5
Confidence in the responses	36	3	1.014	1	5
Rank: Scenario A	36	3.972	.940	1	6
Rank: Scenario B	36	1.638	1.291	1	6
Rank: Scenario C	36	4.972	1.341	1	6
Rank: Scenario D	36	2.555	.969	1	5
Rank: Scenario E	36	4.555	1.557	1	6
Rank: Scenario F	36	2.805	1.348	1	6
WTP to prevent Scenario A: 10%	4	82725	145059.9	900	300000
WTP to prevent Scenario A: 50%	5	106201	220288.3	5	500000
WTP to prevent Scenario A: 100%	7	1448001	3771241	10	1.00e+07
WTP to prevent Scenario B: 10%	8	175876.3	348051.2	10	1000000
WTP to prevent Scenario B: 50%	12	1332419	3082317	25	1.00e+07
WTP to prevent Scenario B: 100%	20	1.05e+07	3.07e+07	50	1.00e+08
WTP to prevent Scenario C: 10%	3	106668.3	167728.4	5	300000

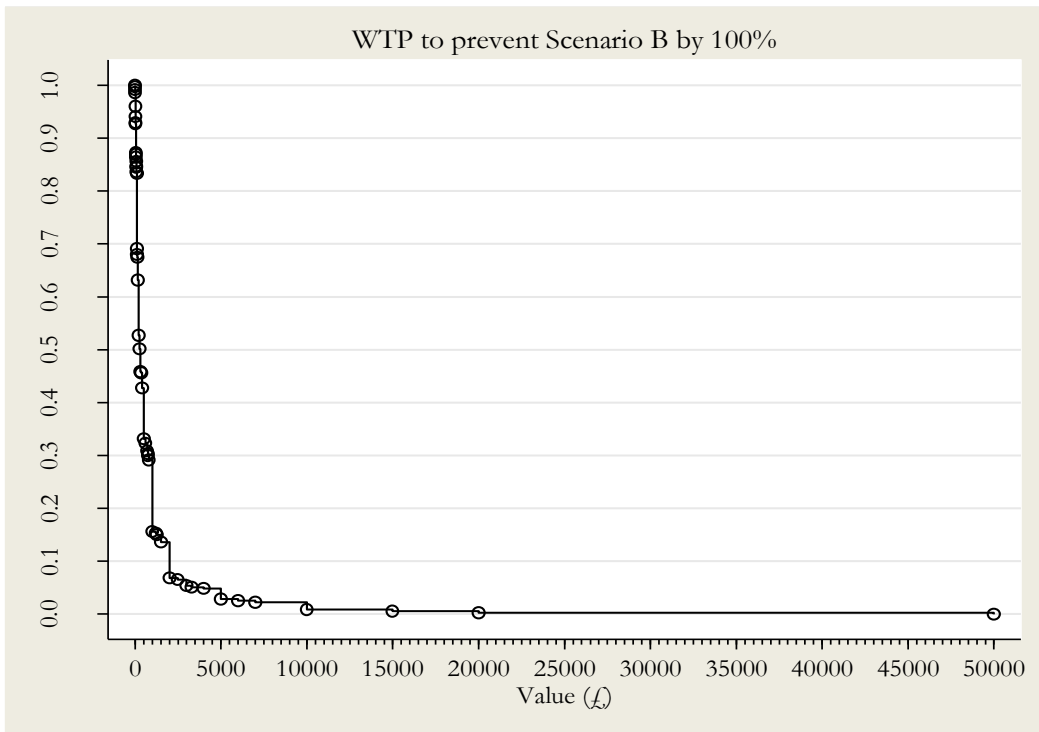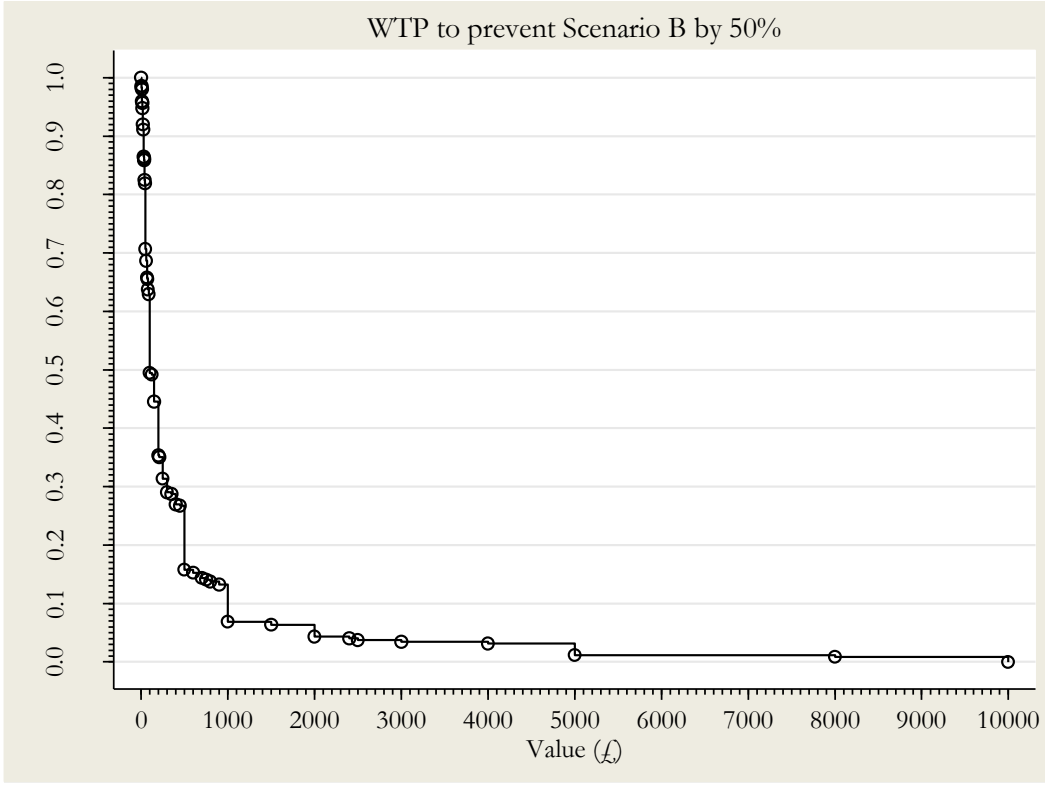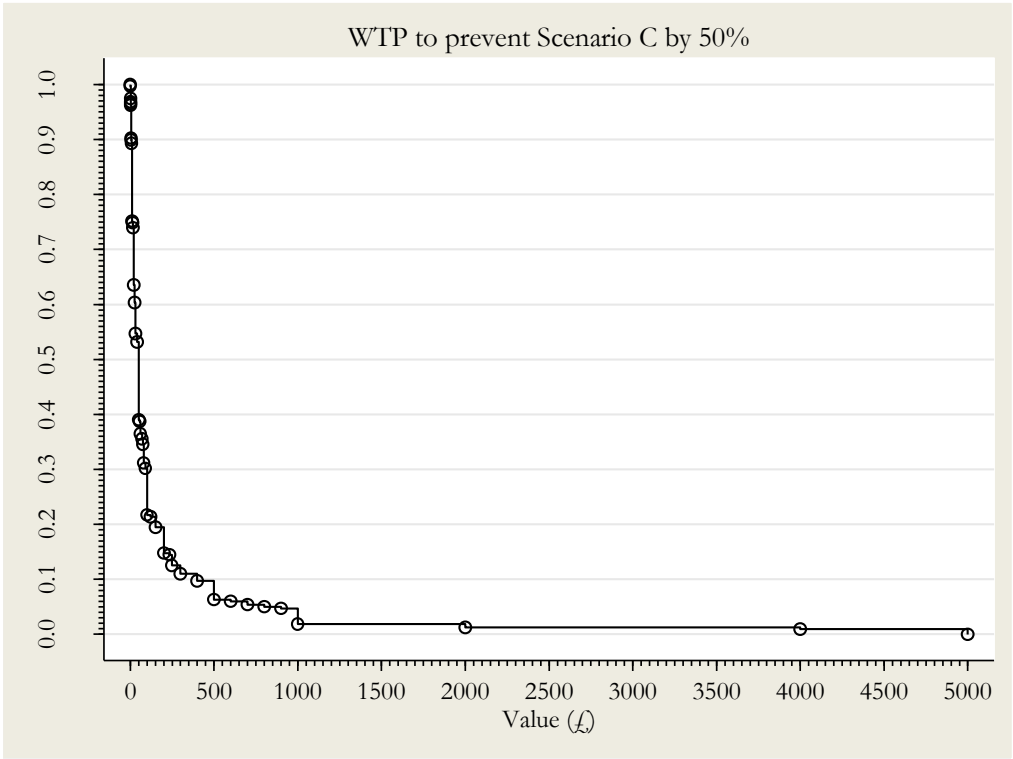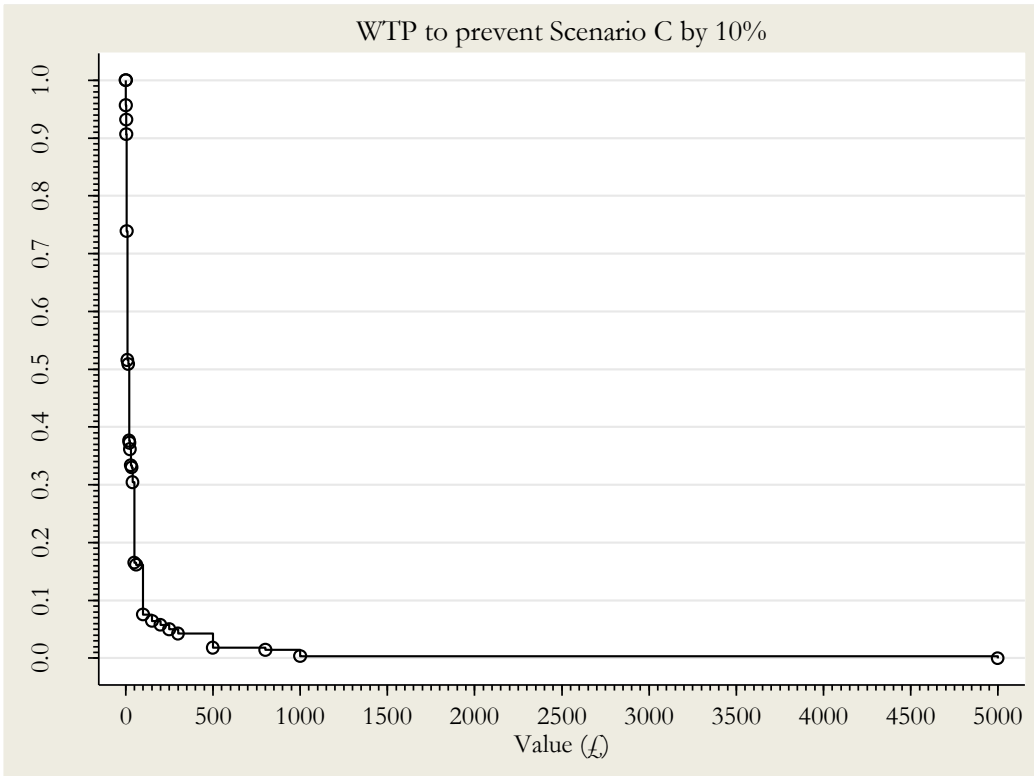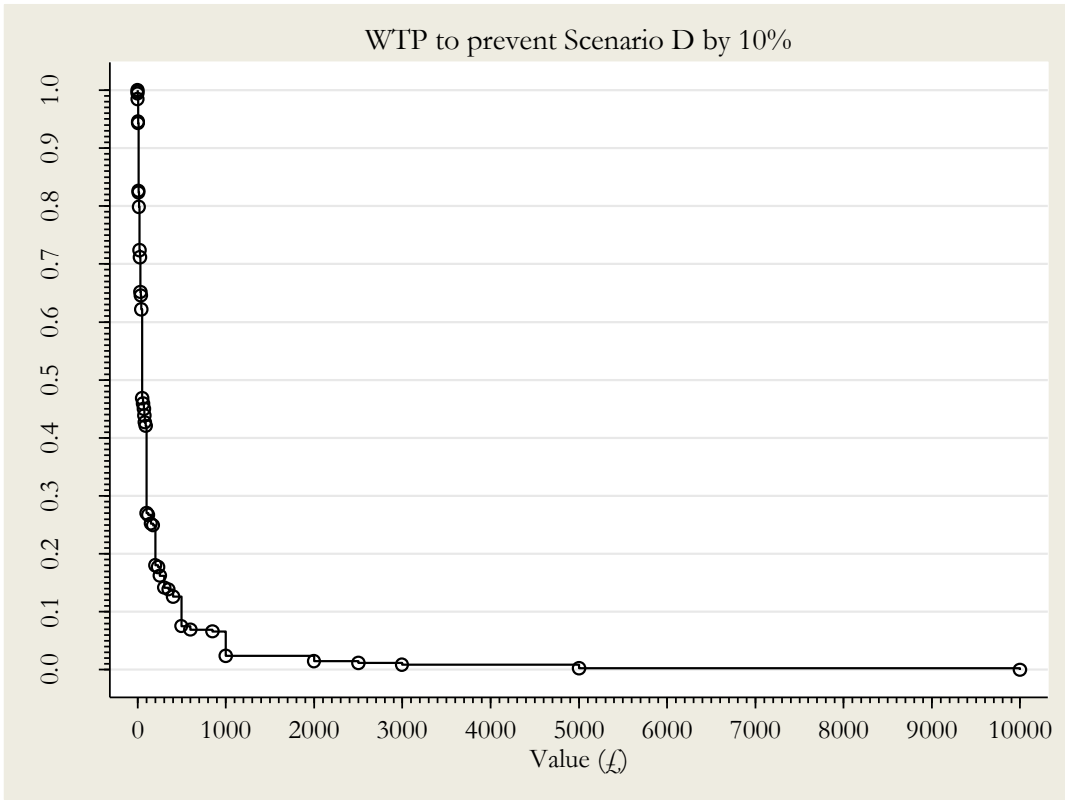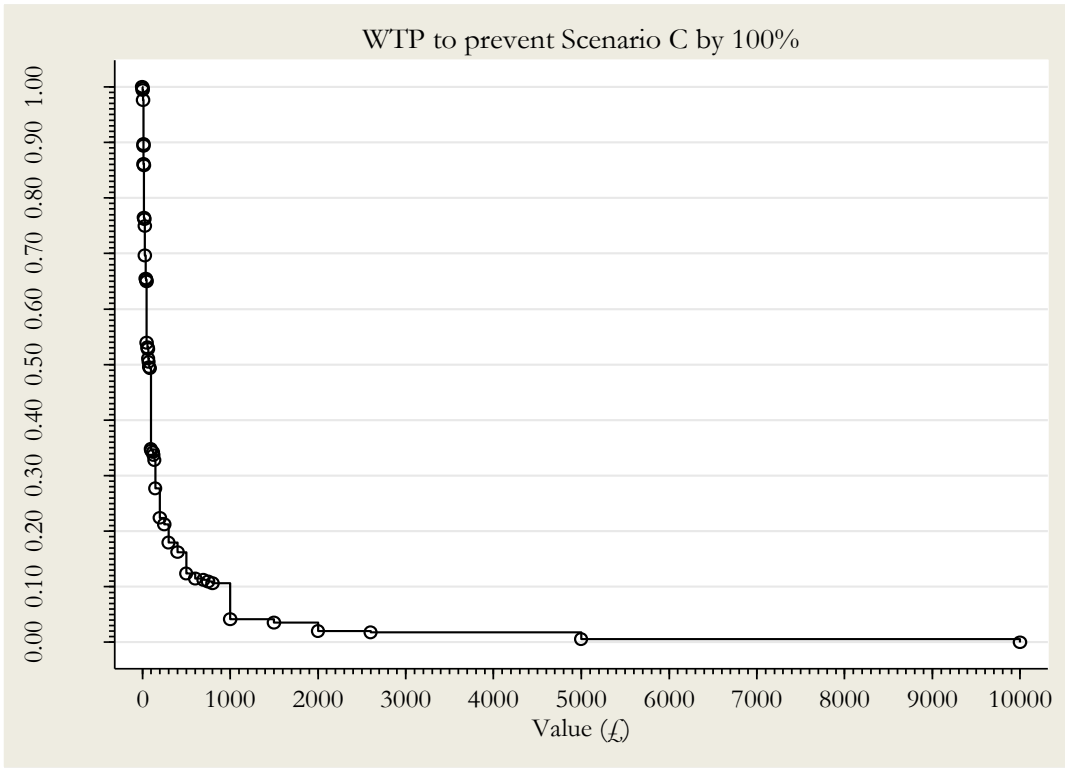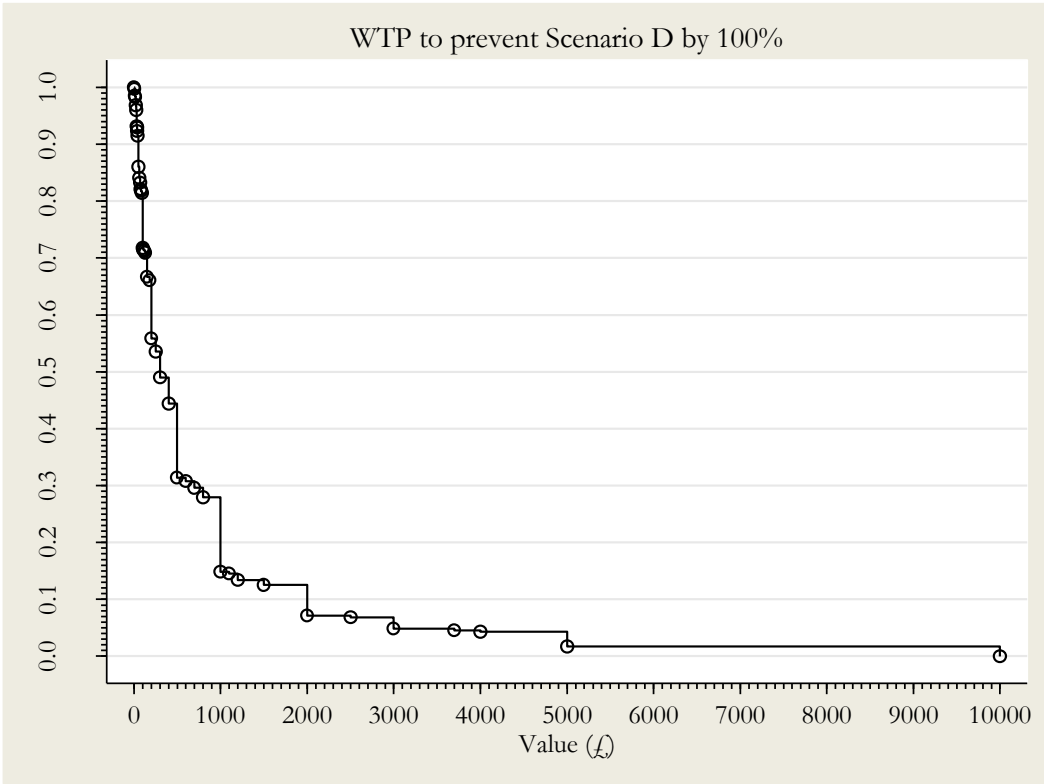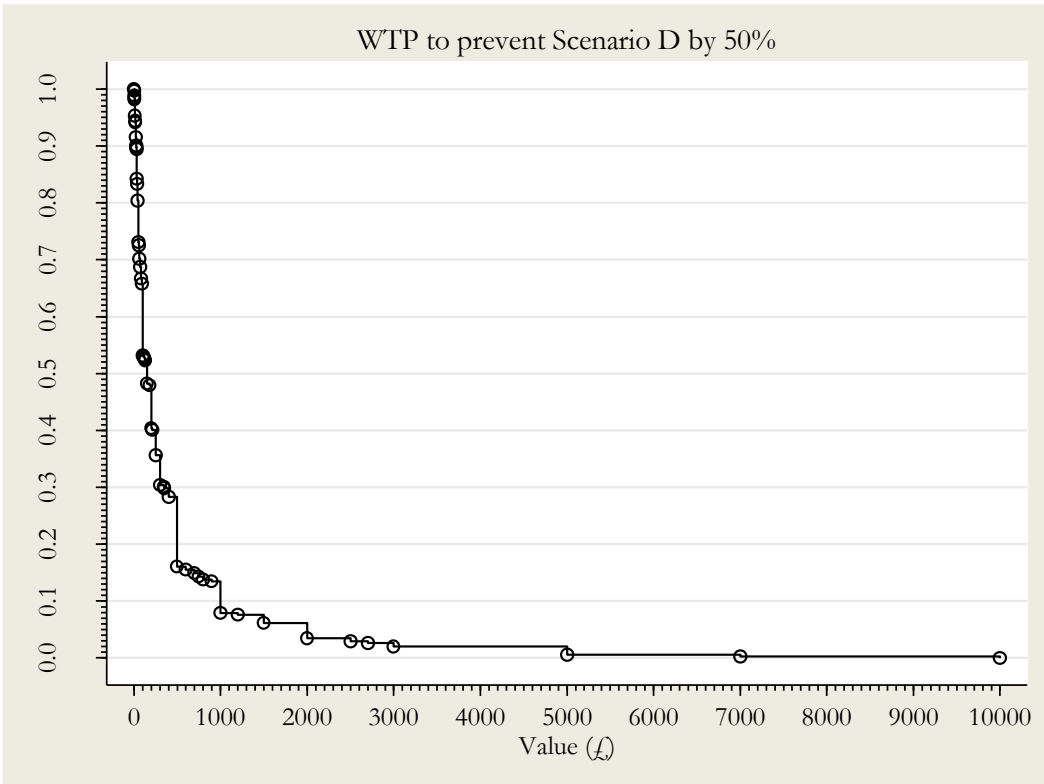|					
WTP to prevent Scenario C: 50%	5	1030202	2219838	10	5000000
WTP to prevent Scenario C: 100%	8	1.26e+07	3.53e+07	25	1.00e+08
WTP to prevent Scenario D: 10%	11	45638.18	89578.3	20	300000
WTP to prevent Scenario D: 50%	14	1125539	2877351	50	1.00e+07
WTP to prevent Scenario D: 100%	22	9515709	2.93e+07	100	1.00e+08
WTP to prevent Scenario E: 10%	4	82751.25	145499.1	5	300000
WTP to prevent Scenario E: 50%	4	1272753	2485190	10	5000000
WTP to prevent Scenario E: 100%	6	1.78e+07	4.04e+07	15	1.00e+08
WTP to prevent Scenario F: 10%	9	50391.67	98874.52	25	300000
WTP to prevent Scenario F: 50%	15	1011787	2798623	50	1.00e+07
WTP to prevent Scenario F: 100%	25	8054568	2.77e+07	100	1.00e+08
WTP to prevent any Scenario	12	8.33e+07	2.89e+08	50	1.00e+09
WTP per month to fund victimisation programme: 10%	3	335	285.7884	5	500
WTP per month to fund victimisation programme: 50%	5	1483	2003.982	15	5000
WTP per annum to fund victimisation programme: 10%	2	3075	4136.575	150	6000
WTP per annum to fund victimisation programme: 50%	6	10833.33	13140.27	500	36000

Before aggregating the valuation data individual level analysis was carried out to assess the responses that were recorded as 'protests' (outliers). All responses identified as outliers were examined separately and the profiles of the responses are summarised in the Appendix 3 (see Table in section 3.3). Results indicated that for the WTP data, the outliers for the different outcomes were always from the same 36 respondents but not consistently. That is, some provided an extreme value in some of the questions asked but not in all. Only 3 of these respondents provided consistently unusable responses in all CV questions.

To assess the agreement in the rank ordering of WTP across all respondents, the Friedman test was employed. The null hypothesis was that the distribution of the ranks of each type of score was the same. To perform the test, data was initially transposed (subjects to columns and values to rows). Results indicated that for all WTP values on preventing the Scenarios A-F from happening, the Friedman chi-square statistic was significant at the 1% level of significance (Friedman = 4.4e+03, Kendall = 0.6398, p-value = 0.0000) suggesting that there is a difference in the obtained WTP values. Similar, the Friedman statistic was significant at the 1% level when testing for differences in the WTP values for funding the victimisation programme (Friedman = 251.5707, Kendall = 0.6586, p-value = 0.0000), the compensatory amounts (Friedman = 1.3e+03, Kendall = 0.6835, p-value = 0.0000) and the ranking of the Scenarios (Friedman = 1.1e+03, Kendall = 0.5861, p-value = 0.0000).

3.4 Frequency plots to show spike at zero for WTP data

WTP prevent the chance of Scenario A from happening by 50%

WTP prevent the chance of Scenario A from happening

411

WTP prevent the chance of Scenario B from happening by 10%

WTP prevent the chance of Scenario B from happening by 50%

WTP prevent the chance of Scenario B from happening

WTP prevent the chance of Scenario C from happening by 10%

WTP prevent the chance of Scenario C from happening by 50%

WTP prevent the chance of Scenario C from happening

414

WTP prevent the chance of Scenario D from happening

WTP prevent the chance of Scenario E from happening by 10%

WTP prevent the chance of Scenario E from happening by 50%

WTP prevent the chance of Scenario E from happening

WTP prevent the chance of Scenario F from happening by 10%

WTP prevent the chance of Scenario F from happening by 50%

418

WTP prevent the chance of Scenario F from happening

the most respondent would be willing to pay to avoid any scenario

WTP per month to reduce the chance of victimisation by 10%

WTP per month to reduce the chance of victimisation by 50%

WTP per year to reduce the chance of victimisation by 10%

WTP per year to reduce the chance of victimisation by 50%

3.5 Higher resolution graphs of the KM survivor functions for all WTP valuations

WTP to prevent Scenario A by 10%

Value (£)

WTP to prevent Scenario A by 50%

WTP to prevent Scenario A by 100%

WTP to prevent Scenario B by 50%

WTP to prevent Scenario B by 100%

WTP to prevent Scenario C by 10%

WTP to prevent Scenario C by 50%

WTP to prevent Scenario C by 100%

WTP to prevent Scenario D by 10%

426

WTP to prevent Scenario D by 50%

WTP to prevent Scenario D by 100%

WTP to prevent Scenario E by 10%

WTP to prevent Scenario E by 50%

WTP to prevent Scenario E by 100%

WTP to prevent Scenario F by 10%

429

WTP to prevent Scenario F by 50%

WTP to prevent Scenario F by 100%

430

WTP for any Scenario

Monthly WTP for 10% crime reduction
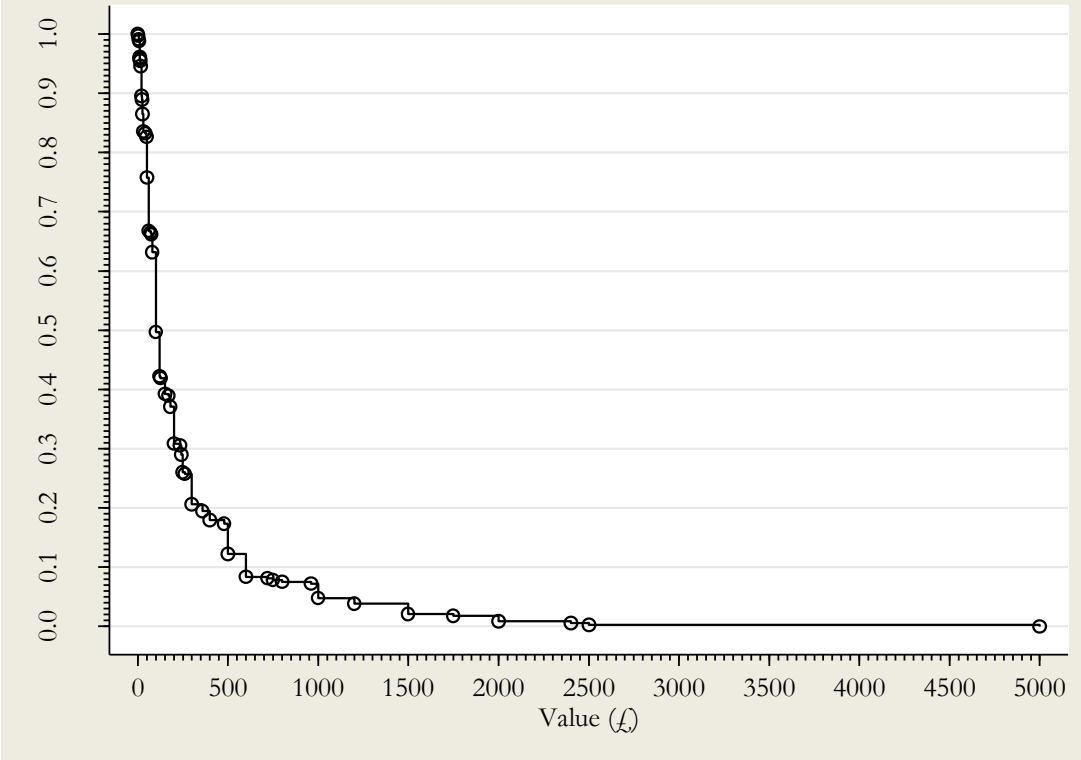
Monthly WTP for 50% crime reduction

Annual WTP for 10% crime reduction

Annual WTP for 50% crime reduction

3.6 Illustration of median (left) and mean (right) WTP for any Scenario as estimated from the KM survivor function
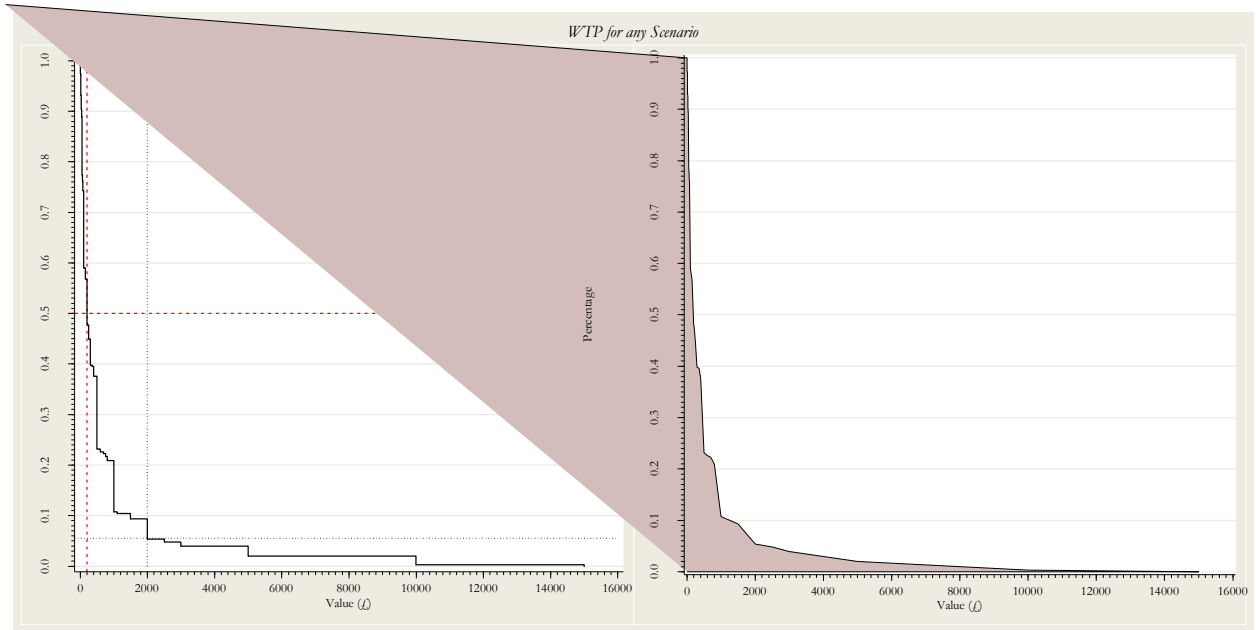

Figure on the left incorporates additional reference axes to denote the median (0.5 point on the Y-axis; red dash lines) and a random WTP value (x=2000; blue dot lines). Figure on the right illustrates the mean WTP denoted by the pink area bounded by the survivor function.