Victimisation, Wellbeing and Compensation: Using Panel Data to Estimate the Costs of Violent Crime[1]

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Abstract

The costs of violent crime victimisation are often left to a tribunal, judge or jury to determine, which can lead to considerable subjectivity and variation. Using panel data, this paper provides compensation estimates that help reduce the subjectivity of awards by providing a benchmark for the compensation required to offset direct and intangible costs. Individual-area fixed-effects models of wellbeing that allow for adaptation and the endogeneity of income suggest that, on average, \$88,000 is required to compensate a victim, with the amount being greater for females (\$102,000) than males (\$79,000).

JEL: I31, K30

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1. Introduction

Even in the most developed countries, many individuals will be exposed to a violent or life-threatening situation during their lifetime (Ozer et al., 2003; Bonanno, 2004). In the US a violent crime occurred every 26 seconds in 2012, with an estimated 1.214 million violent crimes nationally, or about 387 for every 100,000 residents (Federal Bureau of Investigation, 2013). Out of an estimated total cost of crime of $310 billion, more than $250 billion is attributed to violent crime (Chalfin, 2014). In Australia, the focus of this study, there were 969 victims of physical assault, 86 victims of sexual assault, 60 victims of robbery, and 2 victims of homicide per 100,000 persons in 2012 recorded by police (Australian Bureau of Statistics, 2013a,b).[2]

The total cost of violent crime for victims includes direct costs, such as lost wages, medical care costs and property damage, and intangible and potentially long-term costs associated with pain, psychological distress, and a decrease in quality of life (Cohen, 1998, 2000, 2005; Cohen and Bowles, 2010; Dolan et al., 2005; McCollister et al., 2010). For some, experiencing violent crime results in long-term psychopathology, including anxiety, depression and post-traumatic stress disorder (Breslau et al., 1998, 2008). Violent crime can also lead to behavioural changes that affect victims quality of life and daily functioning (Dolan et al., 2005), and can indirectly affect the wellbeing of other family members, friends and neighbours (Cohen, 2005; Mervin and Frijters, 2014).

This paper aims to calculate the amount of monetary compensation required by victims to offset their loss of wellbeing.[3] This research question is important from both legal and public economics perspectives. Ubel and Loewenstein (2008) highlight that valuing damages relating to pain and suffering is critical for legal practice, and Boyce and Wood (2010) note that, "Currently, monetary compensation seems to be unquestionably taken in law courts as the only way of helping an individual overcome psychological distress after a traumatic event." Gaining reliable estimates of compensation is also important for the economic evaluation of social programs aimed at reducing crime, for example substance abuse treatment and community policing (McCollister et al., 2010).

In the US, juries are challenged to award an amount that would make the victim "whole" in their eyes (Cohen, 2000; Cohen, 2005). However, as Boyce and Wood (2010) note, "Putting a price tag on 'pain and suffering' seems an impossible task, but judges in law courts are regularly expected to make such decisions." In the words of Cooter (2003), "courts apparently arrive at

[2] These official figures mask the full extent of violent crime in society. Between 2006 and 2010 in the US, 52 percent of all violent victimisations were not reported to police according to the National Crime Victimization Survey. Similarly, Australian survey data suggest that around 50 percent of physical assaults, 39 percent of robberies and 63 percent of sexual assaults go unreported (Australian Bureau of Statistics, 2012).

[3] We do not attempt in this paper to estimate the wider costs of violent crime to the criminal justice system or crime career costs (see, for example, McCollister et al., 2010).

damages by unaided intuition". Similarly, Ubel and Loewenstein (2008) argue that juries are not well equipped to determine the emotional impact of specific injuries, and suggest removing subjectivity from the task. They contend that jurists are likely to mispredict the hedonic consequences of injuries by overestimating the impacts of physical health conditions. Juries are also prone to affective forecasting errors, anchoring effects, and random sources of variability in their decisions. Geistfeld (1995) finds that only 40 percent of the awards made to victims can be accounted for by the severity of injuries, with the rest potentially attributable to "ostensibly unjustifiable" factors such as race and the victims' attractiveness. To address these limitations of monetary awards, Boyce and Wood (2010) suggest psychological therapy as an alternative way to compensate the victim, but therapy does not compensate for the wider costs of victimisation.

Regardless of how victim compensation is determined, whether by judges, jury members or tribunals, having guidelines is valuable [4] Consequently, providing reliable estimates of compensation, and thus reducing the subjectivity in awards, is an important task. Over the last three decades a number of studies have attempted this; however the estimates vary considerably, justifying the need for further research. For example, Cohen et al. (2004) use cross-sectional data from the US and a contingent valuation approach to estimate that sexual assault should be valued at US$237,000, armed robbery at US$232,000, and serious physical assault at US$70,000. Dolan et al. (2005) use a QALY approach to evaluate the intangible costs to victims in the UK; they calculate £16,800 for rape, £4,800 for sexual assault, £800 for robbery, and £5,700 for serious wounding. Using jury verdicts from the US, McCollister et al. (2010) calculate the intangible costs of rape/sexual assault, aggravated assault, and robbery, to be $199,642, $95,023 and $$22,575, respectively (2008 dollars). Two recent papers, focusing on the mental health effects of victimisation using panel data techniques, find that the required compensation for victims of violent crime is around US$1,000 using a QALY approach (Cornaglia et al., 2014) and around A$463,000 using a compensating variation approach (Mervin and Frijters, 2014).

To estimate the impact of violent crime victimisation on wellbeing and to calculate the amount of required compensation, we use data from two Australian longitudinal surveys that ask respondents annually about their recent experience of violent crime; thus, we observe victims both before and after the event. Our main data source is the Household, Income and Labour Dynamics in Australia Survey (HILDA), which is nationally representative and follows individuals for over a

[4] In Australia, publicly funded tribunal systems are the main vehicle for victims to claim compensation, with the specific procedures and maximum limits varying by state. In Victoria, one of the largest states of Australia by population, for example, compensation is determined by the Victims of Crime Assistance Tribunal. Primary victims can claim up to A$60,000 to cover up to two years of lost earnings and "reasonable expenses" related to counselling, medical bills, damage to property and personal safety (Victorian Victims of Crime Assistance Tribunal, 2015). Additionally, victims may receive up to A$10,000 for any pain and suffering linked directly to the crime. In 2012/13, there were 4,751 awards of compensation with the average amount of compensation being A$7,763.

decade. In contrast, our secondary data source – Journeys Home (JH) – samples adults who are highly vulnerable to violent crime and provides valuable information regarding the perpetrator. Additionally, both surveys include information not only on overall wellbeing but also on different aspects of wellbeing, which we use to examine the areas of victims' lives that are most affected by crime. We are unaware of any other major longitudinal surveys that repeatedly ask respondents about their experience of violent crime and simultaneously collect a wide-range of wellbeing measures.

These detailed longitudinal data allow us to apply modelling techniques that: (1) control for selection into violent crime; (2) demonstrate that violent crime is not predictable after controlling for selection; (3) control for a number of other time-varying life events; (4) incorporate information on windfall income to aid in computing compensatory damages; and (5) consider the extent and speed to which victims' wellbeing adapts over time. The data therefore meet all the necessary criteria for estimating compensatory damages as set out by Oswald and Powdthavee (2008a,b). They also allow us to address concerns in the literature about poor estimation of the effect of income on wellbeing (the denominator in the income equivalence calculation) and the importance of adaptation to income and to victimisation.

To gain confidence in the method we use to calculate the amount of compensation, we work through a number of important steps that provide empirical support for our main modelling assumptions and help identify the underlying mechanisms that link subjective wellbeing to the experience of violent crime. We believe that each of these steps contributes to the existing literature, providing insights that only can be discovered using panel data. In particular, there has been little previous examination of the issue of whether violent crime can be treated as exogenous in empirical models. Moreover, much of the focus in the literature has been on the direct mental health effects of victimisation, whereas we analyse how victimisation affects a broader measure of wellbeing, namely, life satisfaction. Therefore, our estimates encompass not only mental health effects, but also other important effects of victimisation, such as bodily pain, a decrease in general quality of life, potential behavioural changes, as well as financial losses. The use of life satisfaction as a measure of wellbeing is in line with the ideas behind both the tort and tribunal systems, which are designed to compensate the victim for any pain and suffering, not only direct mental health effects.

The paper is set out as follows: Our two panel data sources and measures of violent crime victimisation and wellbeing are described in Section 2. In Section 3 we describe our methodology. In Section 4 we present estimates of the effect of violent crime on overall life satisfaction and consider a number of specific domains such as health, safety, neighbourhood and relationship satisfaction that help us to establish the underlying mechanisms involved. We then consider the extent to which individuals adapt to violent crime. In Section 5 we present the results of the analyses of the Journeys Home data, paying particular attention to the perpetrator of the crime. Once we have all this information, our methodology for calculating compensatory damage is described in Section 6, and the results are compared with existing estimates in the literature. Section 7 concludes.

2. Data and Descriptive Statistics

2.1. HILDA and Journeys Home Surveys

Our primary dataset is drawn from the Household, Income and Labour Dynamics in Australia (HILDA) survey, an annual panel study of Australian households that began in 2001. It collects information from household members aged 15 and over on a variety of economic and social outcomes, including employment, income, health, wellbeing and major life events. We restrict our analysis to the respondents who have information on both wellbeing and crime victimisation, with the latter collected only from 2002 onwards. We use then 11 waves of data (2002-12) and also restrict the analysis to those aged 18-70 observed in their first HILDA interview. This provides a working sample of 106,546 observations on 18,534 individuals.

Our secondary dataset is derived from the Australian Journeys Home (JH) survey, a unique longitudinal survey of individuals who are either homeless, at risk of homelessness or vulnerable to homelessness. The data are collected biannually and there are now six waves available, covering 2011 to 2014. The initial sample was equally distributed between homeless (35 percent), at risk of homelessness (37 percent) and vulnerable to homelessness (28 percent).[5] The homeless and at-risk-of-homelessness individuals were identified by Centerlink, which administers social security payments in Australia. Those vulnerable to homelessness have not been identified as homeless by Centerlink, but they possess similar characteristics to the homeless group (see Wooden et al., 2012, for further details). After omitting respondents with missing information on wellbeing and crime victimisation we have a sample of 7,629 person-year observations on 1,508 individuals.

The JH data have several distinct features compared to general population surveys. First, the surveyed population is particularly vulnerable to violent crime victimisation: roughly around two-thirds of the sample report having been a victim of physical violence since reaching adulthood (18 years of age). This sub-population is therefore particularly relevant from a policy perspective. Their higher incidence of victimisation also helps us to more precisely identify the effect of victimisation on wellbeing. Furthermore, the JH survey includes more specific questions about violent crime

[5] In the JH survey, homelessness is defined generally and incorporates any individuals living in situations that fall below community standards. The survey therefore includes ‘homeless’ respondents who are: without accommodation, living with friends or family in short-term arrangements, and living in boarding houses and caravan parks.

experiences than other surveys. In particular, respondents are asked about the relationship of the victim to the perpetrator, and we use that to separately identify intimate-partner violence.

2.2. Measuring Violent Crime Victimisation

In HILDA's confidential self-completion questionnaire, respondents are asked annually (except in wave 1) about a wide array of major life events that have occurred during the past 12 months. Most importantly for our purposes, respondents are asked about being a "victim of physical violence (e.g., assault)". Although there is no specific reference to 'crime' in the physical violence question, an act of physical violence against another person would generally be considered a crime in Australia. Consequently, throughout the paper we use the term "violent crime victimisation".

One limitation of the HILDA questionnaire compared to the more extensive questions asked in the JH survey is that no further information is available on the nature or perpetrator of the violent crime. Based on the broad wording of the question, though, we conjecture that the HILDA based definition of violent crime victimisation captures the most common forms of violent crime, including physical and sexual assault, and robbery if it involved violence. We expect that this definition will capture violence from all sources, including spouses, relatives, friends and strangers.

About 1.5 percent of the HILDA sample report being victims of physical violence in the past 12 months.[6] Of the 1,126 respondents, 74% (836 respondents) report one incident across the 11 waves, 17% (190) report two, 5% (59) report three, and 4% (41) report four or more. Moreover, this pattern holds across gender and age groups. The data therefore suggest that the majority of reports of violent crime in HILDA are unique events, rather than episodes of long-term sustained abuse.[7]

Figure 1 shows that violent crime victimisation is strongly correlated with age, gender and socioeconomic status. We see that the probability of victimisation decreases with age for males and females, and that individuals living in more disadvantaged neighbourhoods (bottom quartile of the socioeconomic advantage index), which have higher crime rates, are more likely to be victims of violence. Therefore, the group with the highest victimisation rate is 18-30 year-old women living in disadvantaged neighbourhoods: their probability of experiencing physical violence within the past 12 months is 4.6 percent.

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[6] The percentage reporting violent crime Victimisation in HILDA is lower than in cross-sectional surveys undertaken by the Australian Bureau of Statistics. For example, in the 2011-12 Crime Victimisation Survey, 3.25 percent of 20-64 year-old individuals reported being a victim of physical assault in the past 12 months (Australian Bureau of Statistics, 2013a,b). It is possible that this difference is due to survey priming effects. The ABS survey is aimed specifically at collecting information on crime victimisation and includes many preceding questions on aspects of crime victimisation. Individuals' therefore may be more likely to recall minor incidents that are not reported in HILDA.

[7] Regarding attrition, individuals who report being a victim of physical violence in wave t are no less likely than non-victims to respond in wave $t + 1$ (t-statistic = 0.15). Moreover, those victims who have experienced a large drop in life satisfaction are no less likely than other victims to respond in wave $t + 1$ (t-statistic = 0.92).

The reported violent crime victimisation rates are much higher in the JH data than in the general population. Around 17 percent of respondents answered yes to the question "Has anyone used physical violence or force against you in the last six months?" Amongst those who experienced physical violence, 33 percent were assaulted by a stranger, 37 percent by someone known to the victim (not the partner), and 30 percent by their partner or ex-partner.

2.3. Wellbeing Outcome Measures

Our main measure of subjective wellbeing is an individual's overall satisfaction with his or her life. In both HILDA and JH, respondents are asked "All things considered, how satisfied are you with your life?" Responses range from 0 (totally dissatisfied) to 10 (totally satisfied). In addition to overall life satisfaction, we examine satisfaction with different aspects of life. In HILDA, respondents are asked about their satisfaction with: your relationship with your partner; the home in which you live; your employment opportunities; your financial situation; how safe you feel; feeling part of your community; your health; the neighbourhood in which you live; and the amount of free time you have. These detailed satisfaction questions are one advantage of using HILDA, as they allow us to determine the aspects of life most strongly affected by violent crime victimisation. The aspects related to health, relationships, home, safety and neighbourhood are particularly relevant.

Figure 2 plots the distributions of overall life satisfaction scores in the HILDA and JH datasets. Consistent with other general population surveys, in HILDA most individuals are satisfied with their life. Both the mean and the median of life satisfaction are close to 8. The JH respondents have lower life satisfaction than the HILDA respondents (mean of 6.6 and median 7), which is expected since the JH sample is economically disadvantaged compared to the general Australian population. We also see significant differences within HILDA and JH between victims of violence and non-victims. In both surveys, far fewer victims report satisfaction scores ≥ 8 and far more victims report scores ≤ 5 than non-victims do.

3. Methodology

Our primary approach for modelling the effect of violent crime victimisation ($victim_{iat}$) on the wellbeing (wb_{iat}) of individual *i* living in area *a* in period *t* is linear regression with fixed-effects at the individual-area-level. The simplest regression model used can be expressed as:

$$wb_{iat} = \alpha_{ia} + \gamma_t + \delta victim_{iat} + LE'_{iat}\beta + X'_{iat}\theta + \varepsilon_{iat} \qquad (1)$$

where wb_{iat} represents a measure of wellbeing, $victim_{iat}$ is a binary variable indicating violent crime victimisation in the past 12 months, α_{ia} is an individual-area fixed-effect, γ_t is a time fixed-effect, and ε_{iat} is a random error term. The vector LE_{iat} contains 11 binary life-event variables that control for changes in an individual's economic, employment and family circumstances. The vector X_{iat} includes traditional control variables, such as age, employment status and household income. Both sets of control variables were chosen because they represent time-varying characteristics that we expect are more likely to determine victimisation than the other way around. For example, being 'fired or made redundant' may increase the likelihood of victimisation through changes in time-use and living situations, but is less likely to be a consequence of victimisation. Accordingly, we therefore include this variable as a control. Conversely, separating from your spouse may be the result of domestic violence, and so is not included. Importantly, however, the estimated effect of $victim_{iat}$ is little affected by the choice of included control variables; for example, omitting all the work-related variables changes the estimated effect on life satisfaction by 2% for females and 4% for males, and removing all control variables changes the estimated effect by only 3% and 8%, respectively.

One important feature of equation (1) is the individual-area fixed-effect (α_{ia}). Local areas are defined by 196 'statistical subdivisions' that define "socially and economically homogeneous regions characterised by identifiable links between the inhabitants" (Australian Bureau of Statistics, 2001). The inclusion of an individual-area fixed-effect means that an individual living in area A is treated separately from the same individual living in area B. Furthermore, it implies that identification of δ is driven by changes over time in wb_{iat} and $victim_{iat}$ for an individual living within a particular area; this is the approach taken by Dustmann and Fasani (2016) in their analysis of the mental health effects of area-level crime in Britain. We take this conservative approach because a change of neighbourhood may affect both the probability of crime victimisation and wellbeing. One disadvantage of including individual-area fixed-effects is that the effects of violent crime victimisation may be under-estimated if severely affected victims are induced to move to new areas.

The main empirical issue is the validity of treating victimisation as an exogenous event in equation (1). It is possible that unobserved time-varying events, such as drug and alcohol abuse, may directly reduce reported wellbeing and directly increase the likelihood of being a victim of physical violence. Therefore, in this section we use HILDA data to examine the correlates of violent crime victimisation, in particular across-time within individuals and areas, in order to determine whether the exogeneity assumption seems valid.

Table 1 describes how the individual determinants of victimisation highlighted in the literature (see, for example, Komesar 1973; Farmer and Tiefenthaler, 2003) predict victimisation within the next 12 months in our data. Given the largely cross-sectional nature of this literature, we first present results from OLS models without fixed-effects. The models are estimated separately by gender because males and females are exposed to different types of crimes. Official crime statistics suggest that females are more likely to be victims of domestic violence and sexual assault than males, and that males are more likely to be victims of physical assault and robbery than females (Australian Bureau of Statistics, 2013a). The estimated coefficients for both genders suggest that young, single, non-working individuals are significantly more likely to experience violent crime. Educational attainment and neighbourhood type also appear to be important for females: women without a university education, and women residing in urban areas and in low SES neighbourhoods, are significantly more likely to be victims of crime. These findings are largely consistent with those of previous studies, and to some extent they validate our measure of violent crime victimisation.

Importantly, the demographic and SES characteristics that are predictive of victimisation in the cross-section are not significant predictors across-time within individuals and local areas. The results from the fixed-effects models of victimisation within the next 12 months show that neither age, marital status, neighbourhood SES, employment nor income, are statistically significant predictors of victimisation. Moreover, F-tests of the joint significance of all characteristics have associated p-values greater than 0.10. This also holds true if we disaggregate the samples by age (18-30, 31-50, 50-70) and if we model the binary victimisation outcome using the conditional logit model (results available upon request). This comparison of the OLS and fixed-effects estimates suggests that the determinants of violent crime victimisation are largely fixed over time.

To further explore the exogeneity of violent crime victimisation, we test whether satisfaction levels today (our wellbeing outcomes in later models) are predictive of victimisation within the next 12 months in the individual-area fixed-effects model. Though we do not necessarily expect satisfaction (or dissatisfaction) to directly cause victimisation, it is possible that unobserved events may affect both wellbeing and victimisation. This exercise is conceptually similar to the strict exogeneity test that is obtained by including future victimisation into wellbeing equations and testing the statistical significance of this variable (p. 325, Wooldridge, 2010).

The coefficients on the wellbeing measures from three model specifications (A, B and C) are presented in Table 2, in which the wellbeing measures have been rescaled to vary from 0 (totally dissatisfied) to 1 (totally satisfied). Model A shows that overall life satisfaction has a weak negative effect on victimisation in the following year. For both males and females, moving from "totally dissatisfied" to "totally satisfied" (a one-unit change) decreases the probability of victimisation by only 0.3 percentage points. In Model B we include all sub-scales of satisfaction (safety, home, neighbourhood, health, community, finances and free time) and find that each of the coefficient estimates is small and statistically insignificant. In Model C, we regress victimisation on relationship satisfaction using the subsample with a partner; the coefficient estimates are again small and statistically insignificant. Overall, we find no evidence that unobserved shocks are driving both wellbeing and victimisation.[8]

Finally, we are concerned that the estimated effects of violent crime victimisation on wellbeing could be biased by time-varying local area-level characteristics. Although we control for local area fixed-effects, important unobserved variation across time within areas makes it possible that estimation bias will remain. To examine this possibility, in Model D of Table 2 we test whether future victimisation is affected by reported changes in the neighbourhood environment. In 8 waves of HILDA, respondents are questioned on how often in their local neighbourhood there is: vandalism and deliberate damage to property; people being hostile and aggressive; and burglary and theft. Responses range from 0 (never happens) to 5 (very common), but in Table 2 are re-scaled to range from 0 to 1. The estimates in panel D are all statistically insignificant and suggest that the within-area across-time variation in perceived neighbourhood characteristics does not predict victimisation.

4. Wellbeing Effects of Violent Crime Victimisation using HILDA

Violent crime can affect wellbeing directly and indirectly. This section principally relates to studies that investigate the direct effects of victimisation. Not surprisingly, most of these studies find strong negative effects. Velamuri and Stillman (2008) find that violent crime victimisation is associated with reduced mental health and life satisfaction particularly for those aged 45+, but that the effect does not persist. They also find that violent crime has a stronger effect on wellbeing that property crime victimisation. Among the prominent longitudinal analyses is Frijters et al. (2011) who estimate the effect of various life events, including crime victimisation, on life satisfaction. They also find that crime victimisation reduces life satisfaction, and that individuals adapt to the experience of crime relatively quickly (within a year). Other longitudinal studies focus on the effect of victimisation on mental health.[9] Braakmann (2013) finds that mental health is negatively affected by crime victimisation. Cornaglia et al. (2014) also find that violent crime victimisation negatively affects individuals' mental health, but no significant effect is identified for property crime victimisation. Mervin and Frijters (2014) show that crime negatively affects mental health directly via own victimisation and indirectly through partner's victimisation.[10] Both Cornaglia et al. (2014)

[8] If life satisfaction affected future victimisation via any of the control variables, we could be under-estimating its effect on victimisation. To address this concern, we re-estimated all models excluding covariates and found consistent results: none of the satisfaction variables were statistically significant.

[9] There also is a large cross-sectional literature on the wellbeing consequences of crime victimisation. Some examples include Michalos and Zumbo (2000), Powdthavee (2005), Zlotnick et al (2006), Cohen (2008), Hanslmaier (2013), Kuroki (2013) and Staubli et al. (2014).

[10] More recently, Mahuteau and Zhu (2016) provide additional evidence using HILDA that violent crime victimisation reduces mental health and life satisfaction, but they do not address the question of compensation.

and Mervin Frijters (2014) use their estimates to calculate compensation for victims of violent crime, and we will discuss how their results compare to ours based on life satisfaction in Section 6. Potential indirect effects of crime found in the wider international literature include increased fear, reduced feelings of safety, and lower neighbourhood property prices: see, for example, Powdthavee (2005), Moore (2006), Cohen (2008), Kitchen and Williams (2010), Braakmann (2012), Ambrey et al. (2014), Dustmann and Fasani (2016) and Janke et al. (2016).

4.1. Direct Wellbeing Effects

Estimated coefficients on victimisation (δ) and other major life events (β) from a linear regression model with individual-area-level effects (see equation 1) are shown in Table 3. We see that violent crime victimisation has a large negative effect on overall life satisfaction (scaled from 0 to 10): victimisation in the past 12 months is estimated to decrease life satisfaction of females and males by -0.398 and -0.300, respectively, or approximately 45% and 36% of the within-individual standard deviation of life satisfaction (which equals 0.882 and 0.825 for females and males, respectively). This effect is roughly equivalent in size to the "death of spouse or child" effect, and is multiple times larger than the "victim of a property crime" effect. Only a "major worsening in financial situation" is more detrimental to life satisfaction than violent crime victimisation in this data.[11]

Table 4 reports our estimates for separate domains of life satisfaction. For women, the domain most affected is satisfaction with "your relationship with your partner". Victimisation in the past 12 months is estimated to decrease relationship satisfaction of partnered women by 0.887 units, which is almost 75 percent of the within-individual standard deviation.[12] For females the next most affected domains are "how safe you feel" and "the home in which you live". For men, "how safe you feel" and "the neighbourhood in which you live" are significantly affected, but "the home in which you live" is not. Therefore, it appears that a victimised female is most dissatisfied about her domestic relationship and her safety at home whereas a victimised man is most dissatisfied about his safety in his neighbourhood. Importantly, health satisfaction is only moderately affected by victimisation, highlighting the need to consider broader psychological outcomes when valuing damages.[13]

[11] It is unclear what a "major worsening in financial situation" means; however, HILDA provides respondents with the example "went bankrupt", so it is possible that this event represents wide-ranging changes in an individual's financial, employment and living situations.

[12] We note that the large "relationship with your partner" effect is not caused by focusing on partnered respondents. For all other domains, partnered respondents have smaller effects than single respondents.

[13] Previous studies have documented heterogeneity in the relationship between victimisation and wellbeing by area-level crime rates (e.g. Powdthavee, 2005). We have investigated this possibility by separately estimating our wellbeing regressions for subsamples of areas defined by mean levels of violent crime, by mean response to the HILDA question 'how common are people hostile and aggressive in your local neighbourhood?', and by the Australian census-based SEIFA Index of Relative Socio-Economic Advantage and Disadvantage. The regression estimates suggest that the

A natural explanation for this set of strongly gendered effects is that a significant proportion of reported victimisation by females is domestic violence. HILDA does not contain any information on the types of physical violence experienced, but the statistics from the Crime Victimisation Survey highlight that 32.3 percent of self-reported physical assaults against females were committed by an intimate partner (compared to 6.4 percent for males) (Australian Bureau of Statistics, 2013b). To further test the domestic violence explanation, we report in the bottom two rows of Table 4 the estimated effects of violent crime victimisation on the probabilities of two events, "separated from spouse or long-term partner" and "close family member detained in a jail / correctional facility" – events that may be caused by domestic violence. For females, victimisation is estimated to increase the probability of separation by almost 20 percentage points (mean rate equals 2.3 percent) and increase the probability of family member incarceration by 5.5 percentage points (mean rate equals 1.5 percent). The corresponding male effects are substantially lower, equalling 3 percentage points and 1.4 percentage points, respectively.

4.2. Extent of Adaptation

Equation (1) inherently assumes complete adaptation to victimisation (and all other life events) within one year. Given the severe nature of some violent crimes, it is feasible that wellbeing will remain below baseline for several years or even permanently. To measure the speed of adaptation, we estimate a model that includes *J* lags of each of the included life-events:

$$wb_{iat} = \alpha_{ia} + \gamma_t + \sum_{j=0}^{J} \delta_j victim_{iat-j} + \sum_{j=0}^{J} LE'_{iat-j}\beta_j + X'_{iat}\theta + \varepsilon_{iat} \qquad (2)$$

where the $\delta_0, \delta_1, \ldots, \delta_J$ coefficients capture the wellbeing effects of victimisation after 0-12 months, 12-24 months, et cetera. It is possible to allow for changes in wellbeing prior to the event also, but the analyses in Section 3 show no evidence of such effects.

Estimates of δ_j in equation (2) are reported in Table 5. For comparative purposes we also report β_j for the most harmful life events: "major worsening in finances" and "death of spouse or child". We include four terms (J = 3) for each event and define $victim_{iat-3}$ and LE_{iat-3} as indicators of events that occurred three or more years ago. This definition implies that δ_j and β_j are identified by comparing wellbeing in period $t + j$ with average wellbeing before the event. The coefficients on the victimisation variables suggest that for both genders there is (almost) complete adaptation to violent crime victimisation after one year – joint tests of the statistical significance of

relationship is stronger in areas with greater violent crime, hostility and disadvantage. However, the differences between estimates across subsamples are not statistically significant.

the terms 1-2 years, 2-3 years and 3+ years have *F*-statistic p-values of 0.735 and 0.354. This is also the case for the satisfaction domains highlighted in Table 4 (results available upon request).[14]

In contrast, we find longer adaptation profiles for other major life events. In particular, there are statistically significant effects 1-2 years and 2-3 years after a major worsening in finances and the death of a spouse or child (the three lagged terms are also jointly significant). These results suggest that, relative to other harmful life events, adaptation to violent crime victimisation is quick. A possible explanation for this finding is that some victims of crime are able to take remedial actions, such as separating from a spouse or changing residences.

We note that it is also feasible with the HILDA data to investigate potential within-year adaptation. In addition to reporting the occurrence of physical violence in the last 12 months, respondents report how long ago the event happened. Possible responses are: 0 to 3 months ago (31.8 percent), 4 to 6 months ago (20.5 percent), 7 to 9 months ago (16.3 percent), and 10 to 12 months ago (22.0 percent), where sample proportions are shown in parentheses. The estimated quarter effects for overall life satisfaction equal: -0.549, -0.350, -0.398 and -0.279 (-62%, -40%, -45%, and -32% of a standard deviation) for females and -0.235, -0.321, -0.586 and -0.146 (-28%, -39%, -71%, and -18% of a standard deviation) for males.

5. Disaggregated Victimisation Effects using Journeys Home

The advantages of HILDA data for analysing violent crime victimisation are that it is a high-quality long-running panel and that it includes annual information on victimisation and wellbeing. The disadvantage is that it contains no specific details about the crime. In this section, we additionally use JH data to better understand the types of violent crimes that are causing the largest drops in wellbeing.

JH respondents are initially asked, "has anyone used physical violence or force against you in the last six months?"; and if they reply yes, they are subsequently asked "at the time of the last incident what was your relationship to the person who assaulted you?" From the responses, we create three binary indicators signifying that the perpetrator was a (i) stranger; (ii) partner or (iii) other person you knew. The frequencies of these three indicators of victimisation for females are 2.1 percent, 8.5 percent and 4.6 percent, respectively. The frequencies for males are 8.3 percent, 2.4 percent and 7.5 percent, respectively.

Another difference between the JH and HILDA surveys is that the former contains fewer satisfaction questions, so we can only estimate outcomes that represent satisfaction with your life

[14] It is possible that some violent crime victims who experience especially severe violence, and consequently large drops in wellbeing, drop out of the HILDA sample prior to reporting the victimisation. Such a process would bias the estimates presented in Table 6 towards zero.

overall, how safe you feel, your health and your neighbourhood. These estimates are presented in Table 6. The results for females show the largest negative effects occur for violence committed by a stranger: such an event reduces female overall satisfaction by 0.919, satisfaction with safety by 1.198, satisfaction with health by 0.911, and satisfaction with the neighbourhood by 1.139. These figures correspond to a decline in the respective satisfaction domains by 39%, 49%, 38%, and 40% of a standard deviation. The effects for violence committed by partners and violence committed by other known persons are considerably smaller, particularly the latter. For males the differences between the perpetrator types are generally smaller and less consistent across satisfaction domains: violence committed by a stranger has the largest effect on satisfaction with safety (0.696), violence committed by other known persons has the largest effect on satisfaction with health (0.348), and violence committed by partners has the largest effect on satisfaction with neighbourhood (0.640).

We also can repeat the adaptation analysis from Section 4.2 by including lagged victimisation terms in the fixed-effects regression models. The results, which are available upon request, are similar to those presented using HILDA data. For both females and males, all lagged victimisation terms are small and statistically insignificant, supporting the earlier conclusion that, on average, adaptation to violent crime victimisation is relatively quick in terms of life satisfaction.

6. Compensation Estimates

Based on evidence from all of the analyses and tests so far, we are now in a position to estimate the amount of monetary compensation that is required to return the ‘average’ victim of violent crime to his or her pre-victimisation level of life satisfaction; this is our operational definition of making the victim “whole” again. This life satisfaction method has been used widely in the literature to value the costs of various non-market goods, for example, disability (Oswald and Powdthavee, 2008a), death (Oswald and Powdthavee, 2008b; Deaton et al., 2009), air pollution (Van Praag and Baarsma, 2005; Luechinger, 2010; Levinson, 2012), natural disasters (Carroll et al., 2009) terrorism (Frey et al., 2009) and informal care (Van den Berg and Ferrer-i-Carbonell, 2007). Following Frijters et al. (2011), we extend the conventional approach by considering asymmetric effects of income on life satisfaction, the endogeneity of income, and the adaptation to income and victimisation.

Recent research has shown that there is an asymmetric effect of positive versus negative income changes on life satisfaction, with an income loss having a larger effect than an equivalently sized income gain (Boyce et al., 2013). Considering this asymmetry, and following the standard practice of tort and compensation systems where by victims receive major financial settlements, we evaluate the life satisfaction effects of a large positive income shock. We identify income shocks by using a question in HILDA that asks respondents whether they have experienced during the past year a “major financial improvement, e.g. won a lottery, received an inheritance”. By comparing this event to changes in reported income, we calculate that this positive income shock equates to around A$50,000.

Importantly, Au and Johnston (2015) have shown that this income shock variable reflects lottery wins and inheritances, but not other sources of windfall income – it is not significantly associated with the receipt of income from annuities, pension funds, workers compensation, accident or illness insurance, life insurance, redundancy or severance payouts, gifts from parents or other persons, or company shares, managed funds or property trusts. We also can demonstrate that the occurrence of an income shock in the next 12 months is not significantly associated with demographic or socioeconomic characteristics after controlling for individual-area fixed-effects, nor is it a function of violent crime victimisation, property crime victimisation, a major worsening in finances, a serious injury or illness, death of a close friend, being fired or made redundant, being promoted at work, retiring from the workforce, changing jobs, or separating from your spouse (results available upon request). This is important, because we assume that the relationship between the income shock variable and life satisfaction is entirely due to the additional money; associations between the income shock and other life events would raise concerns about the validity of this assumption. However, the occurrence of a future income shock is associated with the death of a relative as expected, given that bequests are usually given by family members. We control for this alternative pathway between the income shock and life satisfaction by controlling for the death of a relative in the past year, death 1-2 years ago and a death 2-3 years ago.

Finally, we explicitly take into account the long-term adaptation effects of both violent crime victimisation and an income shock by adding the lags of these events:

$$wb_{iat} = \alpha_{ia} + \gamma_t + \delta_0 victim_{iat} + \cdots + \delta_k victim_{iat-k} + \pi_0 ishock_{iat} + \cdots + \pi_l ishock_{iat-l} + LE'_{iat}\beta + X'_{iat}\theta + \varepsilon_{iat} \quad (4)$$

The number of lags is chosen as follows: we add all lags that are statistically significant at the 5 percent level plus two additional lags for each event to ensure that we are adequately capturing the entire adaptation profile. This results in two lags for violent crime victimisation and four lags for the income shock. The cost of violent crime to the victim is then estimated according to the following equation:

$$victimcost = \frac{\sum_{j=0}^{k} \delta_j (1+d)^{-j}}{\sum_{j=0}^{l} \tau_j (1+d)^{-j}} \overline{\Delta income}, \quad (5)$$

where d is a discount rate (set at 5 percent) and $\overline{\Delta income}$ is the average change in household income associated with the income shock (A$48,400).

The results are shown in Table 7. The first column presents the results of the basic approach, using household income to estimate compensation values, and ignoring the asymmetry, endogeneity and measurement-error issues.[15] We estimate that a victim of violent crime would need compensation of close to two million Australian dollars (19.54 * A$100,000) to return to the initial level of life satisfaction. For females, estimated compensation is much larger (A$3.4 million).

The next two columns present the figures used to estimate the cost of violent crime victimisation according to our extended approach, which uses income shocks rather than household income and which accounts for adaptation profiles. Column (2) reports the discounted decrease in life satisfaction due to violent crime victimisation (the numerator of equation 5) and column (3) reports the discounted increase in life satisfaction due to the income shock (the denominator of equation 5). The final column presents estimated compensation values for all individuals, females and males. It is estimated that, on average, violent crime victims would need to be awarded A$87,900. The estimated compensation is higher for females (A$101,800) than for males (A$79,300). The difference between genders is driven by victimisation having a larger negative effect on the life satisfaction of females than males (column 3), and by the income shock having a smaller positive effect on the life satisfaction of females than males (column 4). In other words, women are more adversely affected by being a victim of physical violence and are less positively affected by receiving a large monetary windfall.

Notably, the estimated compensation values in Table 7 are not solely compensating individuals for health problems. The findings in Table 4 suggest that several domains of wellbeing are adversely affected by victimisation. To further demonstrate this important point, we performed a simple decomposition exercise in which the total compensation value is disaggregated by the satisfaction domains presented in Table 4. Each domain-specific compensation value is calculated by multiplying: (i) the total compensation value (Column 4 in Table 7); (ii) the discounted effect of victimisation on that domain (equivalent to Column 2 in Table 7); and (iii) the proportional impact of the domain on individuals' assessment of their overall life satisfaction. The latter is calculated by regressing the difference in overall life satisfaction from before and after the victimisation event on the differences in each of the seven domains. The results of this exercise indicate that the decreases in satisfaction experienced by females with their safety, home, health, community, financial

[15] In this model life satisfaction is regressed on household income, violent crime victimisation, individual fixed-effects, and time-varying control variables. The estimated compensation equals the coefficient on victimisation divided by the coefficient on household income – i.e. the amount of additional income that would be needed to offset the decline in life satisfaction due to victimisation (according to the estimated model).

situation, neighbourhood and time equate to compensation values of A$50,700, A$19,200, A$17,900, A$11,300, A$1800 A$528 and A$300, respectively. The equivalent compensation values for men are A$17,400, A$6,900, A$15,200, A$7,400, A$20,100, A$6200 and A$6,100. Hence, the largest component of the female compensation value is safety. For males the largest component is financial situation; this domain is most important for men largely because it is by far the most important component of men's overall life satisfaction in this data.

Another important feature of the compensation estimates is that they are identified from a sample of income shock recipients, who have similar levels of marriage, employment, educational attainment and household income as the average HILDA respondent. This implies that the estimates in Table 7 reflect compensation values required for victims with roughly average Australian socioeconomic status. Estimated compensation values for low (high) socioeconomic status victims are lower (higher) than presented because the increase in discounted life satisfaction from an equivalently sized income shock is higher (lower).[16]

In terms of gaining some consensus on the amount, on average, of compensation required to be awarded to violent crime victims, our estimates are reasonably in-line with those found by Dolan et al. (2005) that used a QALY method to calculate compensation in the UK. However, one important concern with this approach is that it may underestimate total crime victim costs because the QALY weights are based on physical and psychological injuries sustained in a non-criminal context. As noted by Dolan et al. (2005), injuries sustained as a consequence of crime may well have larger psychological effects than injuries sustained in other circumstances. Society also may value losses associated with crime higher than losses associated with other incidents. Another approach used by McCollister et al. (2010) is to examine actual jury-based compensation verdicts in the US. They estimate that the intangible victim cost related to pain and suffering is US$198,212 per rape/sexual assault, US$13,435 per aggravated assault, and US$4,976 per robbery (in 2008 dollars). However, evidence based on jury awards does not bypass the issue of the subjectivity underlying the compensation calculation.

Our estimates fall in between those of two recent Australian studies that also use the HILDA survey but study the mental health effects of violent crime: Cornaglia et al. (2014) provide a value of US$928 and Mervin and Frijters (2014) provide a value of A$463,533. These studies use fixed-effects regression techniques applied to HILDA data, but with fewer waves than we have available. Both focus on the SF-36 mental health component score as their measure of wellbeing, which is

[16] Roughly 20% of violent crime victims in our sample also experience a financial shock. On average, violent crime victims are younger and less likely to be married, university educated and employed than income shock recipients. If we omit from our sample 25% of income shock recipients most unlike violent crime victims (based on propensity scores), the compensation estimate equals A$51,500.

unlikely to capture any of the wider pathways by which a victim's wellbeing can be affected. Our understanding is that the main reason why the estimate of Cornaglia et al. (2014) is relatively small is because the effect of being a victim on the SF-36 mental health component score is small, reducing the 0-100 scale by only 3 points. Consequently, when this small decline in mental health is multiplied by a QALY dollar value (set at A$50,000), the resulting required compensation to offset this decline is small. In contrast, we believe the main reason why the estimate by Mervin and Frijters (2014) is relatively large is because the relationship between income and the SF-36 score is small, so that a very large amount of compensation is required to offset even a small decline in mental health. Overall, we believe that a focus on overall life satisfaction, and separate sub-domains such as satisfaction with health and safety, can more fully inform on the costs to victims.

7. Conclusions

Tribunals, judges and juries have to make judgements everyday on the costs incurred by victims of violent crime and to decide upon an appropriate compensation amount. While it is relatively straightforward to calculate some of the short-term direct costs, such as lost wages from work absenteeism, health care costs and property damage, the intangible and potentially long-term wellbeing costs associated with physical injury, pain, psychological distress and behavioural change are much more difficult to evaluate. It has been argued that this difficulty means that judges and jurors may not be able to reasonably undertake these assessments, and that there is a great deal of unexplained variation in awards (Ubel and Loewenstein, 2008; Boyce and Wood, 2010). In this respect, Dolan et al. (2005) stress the need for better information about the long-term physical and psychological consequences of being a victim of crime.

In recent years economists have applied a variety of empirical techniques to estimate the cost of crime to victims, and therefore to help reduce the subjectivity around compensation for victims. In this paper, we contribute to this literature by analysing data from two Australian longitudinal surveys that ask respondents in every wave if they have been a victim of violent crime, along with many questions about their wellbeing in different aspects of their life. We are unaware of any other longitudinal surveys that collect this information over a number of years, and the data allow us to use empirical models that control for selection into violent crime and for adaptation to both financial gains and victimisation when calculating compensation. Our modelling strategy essentially mirrors the court process by estimating the amount of compensation a victim of violent crime would need to return them to their pre-victimisation level of wellbeing, or in other words, to make them 'whole' again.

Using estimates from individual-area fixed-effects models that allow for adaptation to crime, we calculate that A$88,000 would be required to compensate the "average victim" of violent crime.

This amount is greater for females (A$102,000) than males ($79,000). Importantly, the compensation values are not solely compensating individuals for health problems, with our findings indicating that several other domains of wellbeing are also adversely affected by victimisation: a victimised female is most dissatisfied about her domestic relationship and her safety at home whereas a victimised man is most dissatisfied about his safety in his neighbourhood. Our results therefore highlight the importance of considering wider psychological effects when considering compensation awards. Moreover, the Journeys Home data has also enabled us to shed some light on whether the wellbeing response of victims is dependent on who is the perpetrator of the crime. Our estimates suggest that compensation values will need to be larger if the perpetrator of the crime is a stranger rather than a friend or relative.

We believe that the compensation estimates we present, together with those of other studies using alternative techniques, can reduce the subjectivity of awards to victims in the court and tribunal systems. These estimates have two main purposes. First, judges and juries within the current court system can be given a benchmark for the 'average' amount of compensation for victims, which they can then use to pivot around, given the nature and severity of particular cases. Second, these estimates can be useful when setting maximum limits for tribunals systems.

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Figure 1: Mean Rates of Violent Crime Victimisation by Age, Gender and Neighbourhood SES

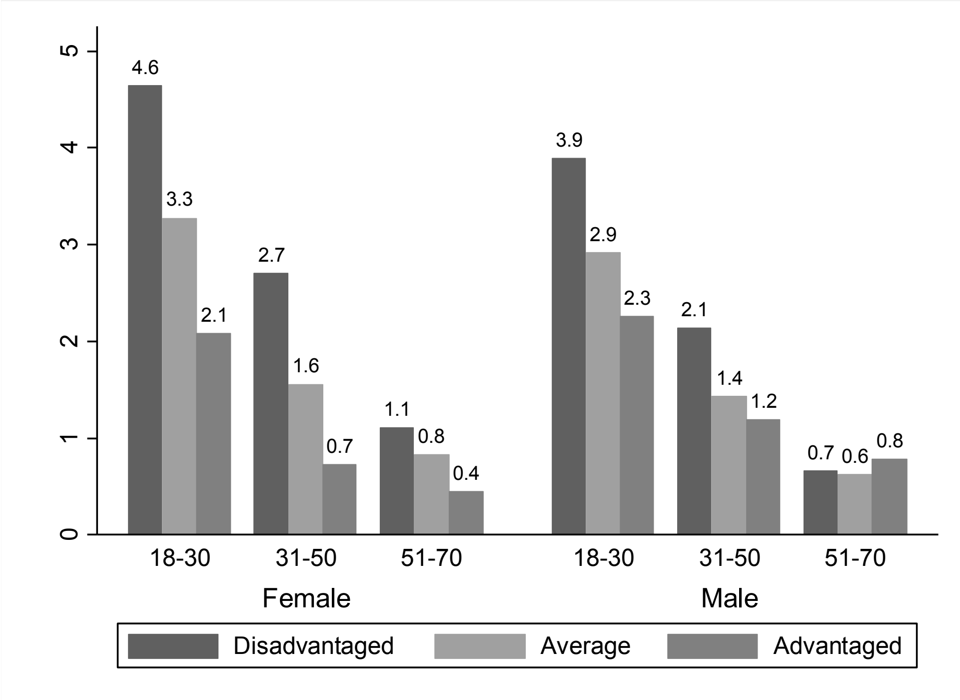

Figure 2: Distributions of Overall Life Satisfaction Scores from HILDA and Journeys Home

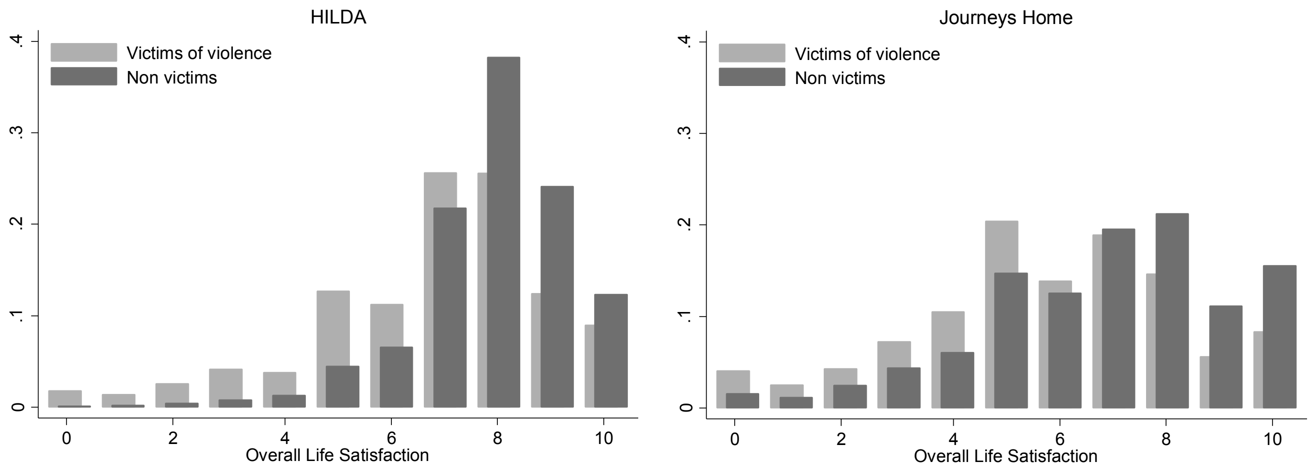

Table 1: Determinants of Violent Crime Victimisation from Cross-Sectional and Panel Models using HILDA Data

	Pooled OLS Models				Fixed-Effects Models			
	Females		Males		Females		Males	
Aged 30-44	-0.006***	(0.002)	-0.005**	(0.002)	-0.002	(0.003)	-0.003	(0.004)
Aged 45-59	-0.008***	(0.001)	-0.007***	(0.002)	-0.002	(0.004)	0.002	(0.005)
Aged 60+	-0.010***	(0.002)	-0.010***	(0.002)	-0.002	(0.004)	0.004	(0.006)
Married / cohabitating	-0.005***	(0.001)	-0.007***	(0.001)	0.002	(0.003)	-0.004	(0.004)
Divorced / separated	0.002	(0.001)	-0.001	(0.002)	-0.007	(0.004)	0.003	(0.008)
Number of children in HH	0.001	(0.001)	-0.000	(0.001)	0.002*	(0.001)	0.001	(0.001)
Number of adults in HH	0.001*	(0.001)	0.000	(0.001)	0.002	(0.001)	-0.000	(0.001)
Reside in rural area	-0.002**	(0.001)	-0.001	(0.001)	-0.022	(0.017)	0.017	(0.010)
University degree	-0.002**	(0.001)	-0.001	(0.001)	-0.009	(0.010)	-0.007	(0.013)
Diploma / certificate	0.001	(0.001)	0.001	(0.001)	-0.006	(0.005)	-0.002	(0.008)
High school graduate	-0.001	(0.001)	-0.001	(0.002)	-0.007	(0.008)	-0.001	(0.012)
Employed full-time	-0.004***	(0.001)	-0.006***	(0.002)	0.002	(0.002)	0.003	(0.004)
Employed part-time	-0.005***	(0.001)	-0.002	(0.002)	0.000	(0.002)	0.005	(0.004)
Unemployed	0.001	(0.004)	0.000	(0.004)	-0.001	(0.005)	-0.001	(0.007)
Retired	-0.004***	(0.001)	-0.004*	(0.002)	-0.001	(0.002)	0.005	(0.004)
Log real HH income	-0.001	(0.001)	-0.001	(0.001)	-0.001	(0.001)	0.001	(0.002)
Home owner	-0.006***	(0.001)	-0.005***	(0.001)	-0.001	(0.003)	-0.002	(0.004)
Neighbourhood SES index	-0.001***	(0.000)	0.000	(0.000)	0.000	(0.002)	-0.000	(0.003)
Unemployment rate	0.000	(0.001)	-0.001	(0.001)	0.000	(0.001)	-0.000	(0.001)
F-test p-value	<0.001		<0.001		0.696		0.163	
Sample size	51886		45462		51886		45462	

Notes: The dependent variable is victimisation in the next 12 months. Figures are estimated coefficients. Standard errors clustered at the individual-area level are presented in parentheses. The F-test p-value refers to a joint significance test of all presented covariates. Included in each model but not shown are year dummies. The fixed-effects models include individual-area fixed-effects. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Table 2: Relationships between Future Violent Crime Victimisation, Current Satisfaction Levels and Current Neighbourhood Perceptions using HILDA Data

		Females		Males	
(A)	Life overall	-0.003	(0.006)	-0.003	(0.006)
(B)	How safe you feel	0.006	(0.005)	-0.001	(0.006)
	The home in which you live	-0.003	(0.004)	-0.002	(0.005)
	The neighbourhood in which you live	0.005	(0.005)	0.006	(0.006)
	Your health	0.003	(0.004)	-0.003	(0.005)
	Feeling part of your local community	-0.001	(0.004)	0.003	(0.004)
	Your financial situation	-0.001	(0.004)	0.005	(0.004)
	The amount of free time you have	0.001	(0.003)	-0.001	(0.003)
(C)	Relationship with your partner	-0.005	(0.005)	0.001	(0.004)
(D)	People being hostile and aggressive	0.005	(0.005)	0.001	(0.005)
	Burglary and theft	-0.000	(0.005)	-0.002	(0.006)
	Vandalism and damage to property	-0.004	(0.005)	-0.003	(0.005)

Notes: Each column presents estimated coefficients from four individual-area fixed-effect models of violent crime in the next year. Each satisfaction measure has been rescaled to range from 0 (totally dissatisfied) to 1 (totally satisfied). Each neighbourhood measure has been rescaled to range from 0 (never happens) to 1 (very common). Included in each model but not shown are the covariates age, employment status, household income, year, and the life events presented in Table 4. The sample sizes for models (A) and (B) equal 51886 and 45462 for females and males, respectively. The sample sizes for model (C) equal 38163 and 35348. The sample sizes for model (D) equal 27570 and 24974. Standard errors clustered at the individual-area level are presented in parentheses. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Table 3: Estimated Effects of Violent Crime Victimisation and other Life Events on Overall Life Satisfaction using HILDA Data

	Females		Males	
Victim of physical violence	-0.398***	(0.074)	-0.300***	(0.070)
Major worsening in finances	-0.514***	(0.044)	-0.498***	(0.042)
Death of spouse or child	-0.420***	(0.087)	-0.297***	(0.102)
Victim of a property crime	-0.054*	(0.029)	-0.087***	(0.027)
Fired or made redundant	-0.052	(0.044)	-0.017	(0.036)
Serious injury/illness to relative	-0.029**	(0.014)	-0.027*	(0.015)
Death of a close friend	-0.001	(0.017)	-0.026	(0.018)
Death of close relative	0.008	(0.016)	-0.001	(0.016)
Promoted at work	0.039*	(0.021)	0.027	(0.019)
Retired from the workforce	0.107***	(0.040)	-0.023	(0.039)
Changed jobs	0.046***	(0.018)	0.059***	(0.018)
Major improvement in finances	0.144***	(0.026)	0.110***	(0.028)
Sample size	55939		49521	

Notes: Figures are estimated coefficients from two individual-area fixed-effect models of overall life satisfaction. Standard errors clustered at the individual-area level are presented in parentheses. The satisfaction measure ranges from 0 (totally dissatisfied) to 10 (totally satisfied). Included in each model but not shown are the covariates age, employment status, household income and year. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Table 4: Estimated Effects of Violent Crime Victimisation on Satisfaction Domains and Family Outcomes using HILDA Data

	Females		Males	
Satisfaction Outcomes (0–10)				
Relationship with your partner	-0.887***	(0.140)	-0.200	(0.126)
How safe you feel	-0.594***	(0.094)	-0.289***	(0.086)
The home in which you live	-0.311***	(0.091)	-0.121	(0.087)
Feeling part of your local community	-0.205**	(0.085)	-0.141*	(0.085)
Your health	-0.191**	(0.075)	-0.198***	(0.069)
The neighbourhood in which you live	-0.172*	(0.088)	-0.172**	(0.086)
The amount of free time you have	-0.023	(0.100)	-0.098	(0.096)
Your financial situation	-0.018	(0.085)	-0.165*	(0.087)
Family Outcomes (0/1)				
Separated from spouse/partner	0.191***	(0.018)	0.030**	(0.014)
Close family member detained in jail	0.055***	(0.012)	0.014	(0.008)

Notes: Each cell presents the estimated coefficient on the violent crime indicator from a separate individual-area fixed-effect model. Standard errors clustered at the individual-area level are presented in parentheses. The satisfaction measures range from 0 (totally dissatisfied) to 10 (totally satisfied), and the family outcome measures are binary indicators of an event in the past year. Included in each model but not shown are all the covariates from the models in Table 4. The sample sizes for the satisfaction outcomes aside from relationship satisfaction are shown in Table 4. The sample sizes for relationship satisfaction equal 42745 and 40194. This question was only answered by respondents in relationships. The sample sizes for the two family outcome measures equal 55824 and 49434. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Table 5: Estimated Effects of Lagged Violent Crime Victimisation on Overall Life Satisfaction using HILDA Data

	Females		Males	
Victim of physical violence				
Occurred 0-1 years ago	-0.448***	(0.101)	-0.380***	(0.115)
Occurred 1-2 years ago	-0.109	(0.098)	-0.005	(0.094)
Occurred 2-3 years ago	-0.044	(0.089)	-0.119	(0.097)
Occurred 3+ years ago	-0.046	(0.083)	0.026	(0.084)
Major worsening in finances				
Occurred 0-1 years ago	-0.510***	(0.058)	-0.508***	(0.054)
Occurred 1-2 years ago	-0.152***	(0.054)	-0.263***	(0.052)
Occurred 2-3 years ago	-0.130**	(0.055)	-0.098*	(0.055)
Occurred 3+ years ago	-0.102*	(0.054)	-0.001	(0.050)
Death of spouse or child				
Occurred 0-1 years ago	-0.482***	(0.116)	-0.411***	(0.158)
Occurred 1-2 years ago	-0.145	(0.099)	-0.209*	(0.123)
Occurred 2-3 years ago	-0.158*	(0.094)	-0.100	(0.124)
Occurred 3+ years ago	0.033	(0.091)	-0.159	(0.112)
Sample size	33951		29477	

Notes: Figures are estimated coefficients from two individual-area fixed-effect models of overall life satisfaction. Standard errors clustered at the individual-area level are presented in parentheses. The satisfaction measure ranges from 0 (totally dissatisfied) to 10 (totally satisfied). Included in each model but not shown are all the covariates from the models in Table 4. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Table 6: Estimated Effects of Violent Crime Victimisation on Overall Satisfaction and Satisfaction Domains using Journeys Home Data

	Females		Males	
Overall				
Stranger	-0.919***	(0.259)	-0.409***	(0.118)
Partner	-0.651***	(0.160)	-0.496**	(0.212)
Other	-0.206	(0.176)	-0.528***	(0.141)
How safe you feel				
Stranger	-1.198***	(0.353)	-0.696***	(0.126)
Partner	-0.737***	(0.187)	-0.504*	(0.301)
Other	-0.477**	(0.215)	-0.631***	(0.165)
Your health				
Stranger	-0.911***	(0.302)	-0.213*	(0.118)
Partner	-0.502***	(0.139)	-0.061	(0.188)
Other	-0.310	(0.198)	-0.348***	(0.113)
Your neighbourhood				
Stranger	-1.139***	(0.430)	-0.398**	(0.177)
Partner	-0.352*	(0.205)	-0.640*	(0.356)
Other	-0.236	(0.234)	-0.276	(0.182)
Sample size	3346		4279	

Notes: Each column presents estimated coefficients from four individual fixed-effects models of satisfaction. Standard errors clustered at the individual-level are presented in parentheses. Each satisfaction measure ranges from 0 (totally dissatisfied) to 10 (totally satisfied). The disaggregated physical crime indicators are binary indicators of an event in the past 6 months. Included in each model but not shown are the covariates age, employment status, household income and year. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Table 7: Estimated Compensation Values from Basic and Extended Approaches

	Compensation Basic Approach	Victimisation Discounted LS	Income shock Discounted LS	Compensation Extended Approach
All individuals	19.54	-0.668	0.369	0.879
	(2.452, 36.63)	(-0.991, -0.346)	(0.209, 0.529)	(0.471, 1.550)
Females	33.73	-0.687	0.333	1.018
	(-20.77, 88.25)	(-1.152, -0.222)	(0.128, 0.539)	(0.379, 2.441)
Males	10.68	-0.678	0.404	0.793
	(0.726, 20.64)	(-1.131, -0.226)	(0.155, 0.654)	(0.312, 1.823)

Notes: The estimates are based on the HILDA sample. The sample sizes equal 43310, 23392 and 19918 for all individuals, females, and males, respectively. Estimates in columns (1)-(3) are generated from individual-area fixed-effects models of overall life satisfaction. Specifically, column (1) shows the ratio of violent crime and income shock coefficient estimates. Column (2) shows the discounted sum of the violent crime and lagged violent crime coefficients using a discount rate of 5% ($\sum_{j=0}^{k}\delta_j(1+d)^{-j}$). Column (3) equals the discounted sum of the financial shock and lagged financial shock coefficients ($\sum_{j=0}^{l}\tau_j\,(1+d)^{-j}$). Column (4) shows estimates calculated using the formula: $(\sum_{j=0}^{k}\delta_j(1+d)^{-j}\,/\sum_{j=0}^{l}\tau_j\,(1+d)^{-j})\overline{\Delta income}$, where d is the discount rate and $\overline{\Delta income}$ is the estimated change in household income associated with the income shock. Conventional cluster-robust 95% confidence intervals are shown in parentheses in columns (1)-(3). Bootstrap 95% confidence intervals using 10000 repetitions and allowing for clustering are shown in column (4).