



Understanding the relationship between crime victimisation and mental health: A longitudinal analysis of population data

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Aim: *To determine whether a change in crime victimisation status (from non-victim to victim) affects mental health.*

Method: *Fixed effects models were used to examine the effect of physical violence and property crime victimisation in the past year on future mental health. The sample pooled 110,671 records from 16,187 persons aged 15 years or older who participated in at least two waves of the Australian Household, Income and Labour Dynamics (HILDA) survey between 2002 and 2011. The analysis controlled for all time-stable factors as well as a wide range of dynamic variables known to be associated with mental health (i.e., partner status, area of residence, labour force status, financial prosperity, ability to raise funds in an emergency, alcohol consumption, smoking status, physical activity, general health, social networks and number of life events).*

Results: *The analysis revealed that becoming a victim of violent crime results in a decrease in mental health. Females had a more pronounced decline in mental health after becoming a victim of violence compared with males. By contrast, there was no evidence that becoming a victim of property crime has a detectable impact on mental health for either females or males.*

Conclusion: *Being a victim of violent crime has an adverse effect on mental health. This effect is apparent for both male and female victims, however there is a greater effect of violent crime on women's mental health.*

Keywords: *Victimisation, violent crime, property crime, gender, longitudinal study, SF-36, mental health, population data, fixed effects model, HILDA.*

INTRODUCTION

The needs and experiences of victims of crime have become increasingly recognised as an important aspect of criminal justice and public policy. In Australia, victim support services grew from community-based organisations and lobby groups. With the passage of time, these services have become increasingly formalised, with the State progressively assuming a greater role in advocacy and service provision for victims of crime (Cook, David, & Grant, 1999). While we know that many Australians will experience an incident of crime in their lifetime, the effect of this victimisation on health has not been sufficiently explored. This is unfortunate given the demand for victim support services; close to 6,000 applications for counselling assistance in 2011/12 were received by the Victims Compensation Tribunal, New South Wales (Victims Services, 2012). As such, it is timely to examine more closely the nature of the relationship between becoming a victim of crime and an individual's subsequent mental health.

There are numerous ways in which an individual can be affected as a victim of crime. One way is the financial loss incurred as a direct consequence of property being stolen. There are also indirect financial costs such as medical expenses or loss of income through time spent in court. Victims of violent crime may also experience physical injury of varying severity, which can have temporary or long-term effects. Other, less obvious, effects of victimisation include feelings of fear, anxiety and social withdrawal (Shapland & Hall, 2007).

There is now a large body of evidence in the international literature showing an association between victimisation and poor physical and mental health. This relationship has been predominately explored in studies of women's experiences of interpersonal violence (IPV), with fewer studies examining the effect on males or victims of property crime. The range of mental health problems found to be associated with being a victim of violence includes depression, post-traumatic stress

disorder, substance abuse, and reduced social functioning (Bonomi, et al., 2006; Britt, 2001; Coker et al., 2002; Hegarty, Gunn, Chondros, & Small, 2004; Kilpatrick et al., 2003; Kunst & Van Wilsem, 2013; Pimlott-Kubiak & Cortina, 2003; Rees et al., 2011; Resnick, Acierno, & Kilpatrick, 1997). While an association between being a victim of violence and poor mental health has been established, there are several plausible explanations for the relationship: (1) that exposure to violence causes a decline in mental health, (2) that people with poor mental health are more likely to experience violence, and (3) that there are common risk factors for both mental health problems and becoming a victim of violence. Methodological limitations of past research, specifically the use of cross-sectional designs and inadequately controlling for important correlates of mental health, mean that we have been unable to confidently determine the nature of the relationship between victimisation and mental health.

A substantial proportion of evidence for an association between poor mental health and victimisation comes from cross-sectional surveys (Afifi et al., 2009; Bonomi et al., 2006; Britt, 2001; Rees et al., 2011; Coker et al., 2002; Hegarty et al., 2004; Kilpatrick et al., 2003). Cross-sectional surveys provide a snapshot of one point in time. This type of study design can demonstrate an association between two variables, however it cannot tell us anything about the direction of the relationship. For example, it is possible that being a victim of crime causes poorer mental health, but it is also possible that people with poorer mental health are more likely to become victims of crime. Longitudinal surveys are a better method for examining issues of cause and effect, as data are collected at multiple points in time, thereby providing information on the sequencing of events.

Determining whether crime victimisation causally affects mental health is further complicated due to the contribution of environment, family background and behavioural factors to mental health. A body of literature has identified a range of socio-demographic factors and health behaviours shown to be associated with poor mental health. Among these factors are childhood maltreatment (Scott, Smith, & Ellis, 2010), stressful life events (Kendler, Karkowski, & Prescott, 1999; Kessler, 1997) and social connectedness (Glass, De Leon, Bassuk, & Berkman, 2006). Demographic characteristics associated with prevalence of mental disorders include age, employment status, country of birth, education (Slade et al., 2009), and partnership status (Willitts, Benzeval, & Stansfeld, 2004). Financial strain (Weich & Lewis, 1998), general health (Smit, Beekman, Cuijpers, de Graaf, & Vollebergh, 2004) and health behaviours, such as physical activity (Hassmen, Koivula, & Utela, 2000), smoking (Brown, Madden, Palenchar, & Cooper-Patrick, 2000) and problematic alcohol use (Sullivan, Fiellin, & O'Connor, 2005), have also been associated with mental health status. Failure to control for these important risk factors when examining the

relationship between crime victimisation and mental health could lead us to erroneously conclude that there is an independent effect of victimisation on mental health or, alternatively, lead us to overestimate the size of any such effect.

Only a few longitudinal studies of the effect of victimisation on mental health have been undertaken. In a study of the effect of IPV on depression in women, Chaung et al. (2012) used a population-based survey of 1,420 American women, aged 18 to 45 years, to identify predictors of depressive symptoms. Recent exposure to IPV and depressive symptoms were assessed at baseline and two years later, along with a range of coping behaviours, including accessing social support, physical activity and substance use. A limited number of socio-demographic variables (age, race, education, marital status and annual income) were also collected. The results showed that IPV at baseline had a significant independent effect on depressive symptoms at follow-up when controlling for baseline depressive symptoms, continued exposure to IPV and socio-demographic variables. However, once the effect of coping behaviours was controlled for, the relationship between baseline IPV and depressive symptoms at follow-up were no longer significant. They concluded that women who experience IPV are at risk of future depression, regardless of whether or not they continue to experience IPV, but that the use of positive coping strategies following IPV reduces the risk of future depression.

Norris and Kaniasty (1994) undertook a longitudinal panel study of victims in the U.S. State of Kentucky, examining levels of psychological distress following criminal victimisation. Their sample of male and female victims of a range of criminal incidents, including property crimes and violence (all forms of violent crimes were included from threats of violence to sexual assault), were compared with a sample of non-victims. Study participants were asked about their experience of crime in the preceding six months, and the Brief Symptom Inventory (Derogatis & Spencer, 1982) was used to assess their psychological state. Respondents who were given a baseline interview were re-interviewed on two further occasions, six months apart. Their final sample consisted of individuals who completed all three interviews: 105 violent crime victims, 227 property crime victims and 190 non-victims. In analysing these longitudinal data the authors were able to control for pre-existing demographic differences between the victim and non-victim groups (including age, education, residential locality and prior experiences of crime). They found that the victims in their study displayed pervasive symptoms of distress, and that victims of violent crimes were more distressed than victims of property crime, who in turn, were more distressed than non-victims. Importantly, they found that the effects of crime on mental health could not be accounted for by pre-crime differences between victims and non-victims.

However, subsequent longitudinal studies have produced conflicting results. In a nationwide prospective longitudinal study of the Dutch population, Denkers and Winkel (1998) examined the wellbeing and emotional state of a sample of 300 victims and 290 matched non-victims of crime. The sample for this study was drawn from 5,218 randomly selected respondents participating in a nationwide panel survey. Respondents were provided with a computer and modem and required to complete online questionnaires on a weekly basis, including a question relating to victimisation in the past week. Respondents who indicated that they had been a victim of crime in the screening question were then given a more detailed questionnaire relating to details of the crime, focusing on financial and physical consequences of the crime and whether it was reported to police. They were sent follow-up questionnaires assessing their emotional reaction to the crime, one week, one month and two months after the victimisation incident occurred. A group of non-victims was selected to match the victim group on gender, age, urbanisation, partner status and presence of children in the household. This matched group of non-victims was also given three follow-up questionnaires to assess their emotional state. The results showed a difference in the persistence of mental health effects for victims of violent crime compared with property crime victims. Their results suggest that property crime victims recover within a month of the incident, while victims of violent crime are impaired for at least two months following the incident. The authors also found that following their victimisation, victims of crime systematically reported lower levels of positive affect than non-victims. However, after controlling for baseline measures of satisfaction with life, the strength of the relationship between victimisation and affect weakened, leading the authors to conclude that victims were, at least in part, already 'unhappier' than non-victims before the crime took place. They suggest that differences in affect between victims and non-victims are predominantly due to pre-existing factors rather than the victimisation episode itself.

The only Australian longitudinal study to examine the relationship between crime and mental health was conducted by Cornaglia and Leigh (2011). These authors examined the mental health of crime victims and non-victims in metropolitan areas using data from the Household, Income and Labour Dynamics (HILDA) survey. HILDA is a large, household-based panel survey which has been conducted in all Australian States and Territories on an annual basis since 2001 (Summerfield et al., 2012). In order to address the issue of pre-existing differences between the victim and non-victim groups, the authors analysed these data using fixed effects models. This method of analysis controls for all individual-level factors that do not change over time (variables that are 'fixed'), by comparing change *within* individuals rather than *between* individuals. Factors that do change over time (dynamic variables) can also be controlled for in the fixed effects

model by including relevant covariates. Cornaglia and Leigh examined data over the period 2001 to 2006 and included the following covariates in their model: age, education, number of children, area level unemployment and number of rainy days. Their preliminary analysis, conducted using ordinary least square estimation (and including all the covariates listed previously), showed a significant detrimental effect of victimisation on mental health for victims of property crime and victims of violent crime. However, once the data were reanalysed using a fixed effects model (therefore controlling all time-stable variables in addition to the control variables included in the preliminary analysis), the size of the effect of victimisation on mental health reduced substantially, with the decline in mental health for victims of property crime no longer statistically significant. The difference in findings between the two methods of analysis demonstrates the importance of controlling for time-stable individual factors in addition to dynamic variables when examining the relationship between mental health and crime victimisation.

Further evidence of the importance of controlling for potentially confounding socio-demographic variables is provided by Fletcher (2010). His study used a sample of 8,851 young people (aged 11 to 19 years at baseline) from a nationally representative longitudinal survey of adolescents in the United States. Data from the baseline interview, and a follow-up interview (conducted seven years later), were used to examine the relationship between IPV and health outcomes, including depression. This study controlled for demographic, health and social factors likely to affect both risk of becoming a victim of IPV and risk of adverse health outcomes (age, ethnicity, education, family composition, birth order, childhood abuse and neglect, family income and pre-victimisation health measures). The analysis showed substantial reductions in the estimates of the size of the effect of IPV on depression as additional control variables were systematically included in the models. The findings of this research indicate that, while IPV has important health impacts on a range of outcomes, including depressive symptoms, failure to control adequately for important confounding variables can result in the size of these effects being inflated by up to 60 percent.

Another aspect of the relationship between crime victimisation and mental health which requires further investigation is the potential for victimisation to affect the mental health of males and females differently. This is a pertinent issue given that the prevalence of mental disorders in the general population differs for men and women. The results of the 2007 National Survey of Mental Health and Wellbeing showed that females were more likely than males to have experienced anxiety disorders and affective disorders; however, males were more than twice as likely as females to have experienced a substance abuse disorder (Slade et al., 2009).

Few studies have examined the mental health effects of victimisation on both men and women. Studies that have tried to

examine this issue have focused on incidents of IPV, and their findings are hampered by the same methodological limitations already discussed. For example, in a national study of male and female IPV victims, Afifi et al. (2009) found that IPV is associated with poor health outcomes for males and females. Moreover, they found that male victims of IPV were more likely than male non-victims to experience externalising disorders, including substance abuse and disruptive behaviour disorders. Female victims of IPV were more likely than female non-victims to experience externalising disorders and internalising disorders (e.g., anxiety disorder).¹ While Afifi et al. (2009) included a range of covariates related to mental health in their analysis, including exposure to childhood physical and sexual abuse, age, marital status, education, household income and ethnicity, the cross-sectional design of the study prevents us from drawing any conclusions about the causal nature of the relationship between exposure to IPV and the mental health outcomes observed.

The longitudinal study, by Fletcher (2010), summarised earlier in this paper, also examined gender differences in the effects of exposure to IPV on mental health. Surprisingly, he failed to find any significant difference in the effects of IPV on mental health by gender when all available control variables were included in his model. It must be noted, however, that his results are based on a sample of adolescents (11 to 17 years at baseline and 18 to 26 years at follow-up) and therefore may not be applicable to a general adult population.

CURRENT STUDY

The aim of the present study is to examine the relationship between crime victimisation and mental health in the Australian context. We use longitudinal data from the HILDA survey to assess whether a change from not being a victim at one point in time to being a victim of crime at a later point in time is associated with a change in mental health. This study builds on the previous analysis of HILDA data undertaken by Cornaglia and Leigh (2011) by: (1) controlling for a broader range of factors known to be associated with poor mental health, (2) expanding the observation period to include data from 2002 to 2011, and (3) using a national sample rather than restricting the sample to metropolitan areas. Furthermore, we examine changes in mental health outcomes by type of victimisation (property versus violence) and investigate potential gender differences in the effect of crime victimisation on mental health.

The principal questions we aim to address are:

1. Does becoming a victim of crime affect the victim's mental health?
2. Is the effect of crime victimisation on mental health different for victims of property crime and violent crime?
3. Is the effect of crime victimisation on mental health different for male and female victims?

As mentioned, one limitation of previous research has been the failure to control for a wide range of risk factors associated with poor mental health. A range of socio-demographic variables and health behaviours, as well as measures of general physical health, social connection and life events, were included in this study to minimise the effect of these confounding variables on the observed relationship between victimisation and mental health. The control variables chosen for inclusion in this study were either direct measures of a previously identified risk factor for mental health problems or the closest available proxy measure available in the HILDA data set. The dynamic controls included in the present study are: partnership status, area of residence, labour force status, financial prosperity, the ability to raise funds in an emergency, alcohol consumption, smoking status, physical activity, general health, social networks and life events. The use of fixed effect modelling controls for the potential influence of other factors known to be associated with mental health status but which did not change over the period of the study period or changed only slightly (such as age, educational achievement, country of origin and childhood neglect).

METHOD

DATA SOURCE

Data were sourced from survey years 2002 to 2011 of the HILDA survey. The HILDA survey is a social and economic longitudinal survey that commenced in 2001 and is repeated every year (Summerfield et al., 2012). The HILDA survey was initiated in 2001 with a large national probability sample of Australian households occupying private dwellings. The panel of persons followed over time includes members of the households sampled in 2001 who provided at least one interview and new members of the original households due to changes in the composition of these households (Summerfield et al., 2012).² The attrition rate, calculated as the percentage of respondents in the previous wave that did not provide an interview in the current wave, excluding those that were out of scope (that is, those that have died or moved overseas), ranged from 13.2 percent for Wave 2 (2002) to 3.5 percent for Wave 10 (2011).

The HILDA study has a number of instruments, including:

- a household form, which records basic information about household composition immediately after making contact;
- a household questionnaire, which records information about the household rather than individuals and usually involves a face-to-face interview with one household member;
- a person questionnaire, which records information about the individual and is a face-to-face interview of every household member over 15 years of age; and

- a self-completion questionnaire, which is given to all persons participating in the person questionnaire to complete in their own time and is either collected by the interviewer at a later date or returned by mail.

The majority of variables of interest for this study were sourced from the self-completion questionnaire.

Further details of the HILDA sampling procedure and survey instruments are available elsewhere (Summerfield et al., 2012) so will not be described further in this report.

STUDY SAMPLE

The sample used in the current study includes 110,671 records from 16,187 persons with between two and ten years of annual survey data across the period 2002 to 2011. Figure 1 shows the number of records available for each stage of the sample selection process (further details on sample selection are available in Appendix Table A1 available online at www.bocsar.nsw.gov.au). In order to be included in the study, respondents were required to meet the following criteria:

1. responded to the person questionnaire (because the self-completion questionnaire was only given to those who responded to the person questionnaire);

2. responded to the self-completion questionnaire;
3. given valid responses to the items in the self-completion questionnaire relating to victimisation in the past 12 months;
4. given valid responses to the items in the self-completion questionnaire used to calculate the mental health score; and
5. have records meeting the above criteria for at least two waves of the survey (though not necessarily in consecutive years).

MEASURES

Data on age, speaking a language other than English at home, highest educational qualification, sex, partner status, area of residence and labour force status were derived from responses to the HILDA face-to-face person interviews. Data on crime victimisation, mental health, the ability to raise funds in an emergency, financial prosperity, alcohol consumption, smoking status, physical activity, social networks and other life events were derived from the self-completion questionnaires.

Mental health

The mental health subscale of the Medical Outcome Short Form (36-item) Health Survey (SF-36) was used to assess mental health.³ The SF-36 is a measure of health-related quality of life that includes both physical and mental health measures on eight subscales (Ware & Sherbourne, 1992). The mental health subscale is based on responses to five questions relating to nervousness and emotional state in the preceding four weeks.

The questions are:

- Have you been a very nervous person?
- Have you felt so down in the dumps that nothing could cheer you up?
- Have you felt calm and peaceful?
- Have you felt downhearted and low?
- Have you been a happy person?

For each question respondents select an answer from the following alternatives:

- All of the time.
- Most of the time.
- A good bit of the time.
- Some of the time.
- A little of the time.
- None of the time.

The SF-36 was designed for use in population-based research and has been extensively assessed for reliability and validity with adults throughout the lifespan (McHorney, Ware, Lu, & Sherbourne, 1994; McHorney, Ware, & Raczek, 1993).

Figure 1. Sample selection criteria for persons responding to the person questionnaire (pooled across survey waves between 2002 and 2011)



^a All records per person were considered and there was between one and ten records per person.

Crime victimisation

Data on victimisation came from two questions in the HILDA survey. Respondents were asked if, in the past year, they were:

- 'A victim of physical violence (e.g., assault)'.
• 'A victim of property crime (e.g., theft, housebreaking)'.

Response options were 'yes' or 'no'.

It is important to note that the HILDA survey does not contain questions relating to the context of violence experienced or the nature of the relationship between the victim and the perpetrator. The current study therefore includes both IPV and non-IPV incidents.

Sex

Sex was defined as the sex identified at the first survey year a person participated.

Control variables

The selection of dynamic socio-demographic variables and measures of health behaviours, general health, social networks and life events included in the fixed effects model was informed by current literature examining correlates of mental health outcomes, and data availability. The following variables were included in the fixed effects model as dynamic controls: partner status, area of residence, labour force status, financial prosperity, the ability to raise funds in an emergency, alcohol consumption, smoking status, physical activity, general health, social networks and number of life events. (For a detailed explanation of how each of these variables were derived, see the Appendix).

Other variables

A number of other socio-demographic variables were used to describe the sample. These characteristics were not used in the modelling as they either did not change over the study period, or only changed by a small amount:

- age in years on June 30 in the year of the interview;
- speaking a language other than English at home at the time of the interview; and
- highest educational qualification achieved at the time of the interview.

STATISTICAL ANALYSES

All statistical analyses were conducted in Stata/MP 12.0.⁴

Analyses of transitions from one year to the next

A paired t-test was used to determine whether a change in mental health scores between one survey year (year t) and the next survey year (year $t+1$) was associated with a change in crime victimisation status (from non-victim to victim) between the

same set of survey years (year t and year $t+1$). A p-value less than .05 indicates a statistically significant change.

This aspect of the analysis was simplified to only include the 87,978 records from 15,719 persons where there were consecutive survey years of data. For example, if a person had survey data for 2002, 2003, 2005, 2007 and 2008, the record for 2005 would be excluded as there was no data for 2004 or 2006, the two potential consecutive years related to 2005.

The sample was restricted in this way to provide a descriptive picture of the relationship between mental health and crime victimisation from one year to the next before presenting the results from the more complicated fixed effects models.

Fixed effects models

Fixed effects models are used to investigate whether becoming a victim of crime impacts mental health. Fixed effects models have an advantage over many other regression methods as they can control for all factors that are stable or 'fixed' over time regardless of whether they are measured or not. To do this, fixed effects models examine changes in mental health *within* rather than *between* individuals (Allison, 2009). Take for example the effect of childhood trauma, which has been found to be strongly associated with later onset of depression (Smit et al., 2004). The fixed effects model will control for the effect of this risk factor amongst a sample of adults even if this information is not available. This is because each individual's status as a victim of childhood trauma will not change over the study period. Additionally, the fixed effects model enables the inclusion of known variables that change over time, such as an individual's general health. In our case we will control for a set of dynamic factors known to be associated with mental health outcomes.

The fixed effects models allow us to examine whether a change in victimisation status between any pair of survey waves (not necessarily consecutive) is associated with a change in mental health between the same pair of survey waves. The fixed effects models used the full study sample of 110,671 records from 16,187 persons.

Two fixed effects models were used in the current study:

1. Controlling for dynamic factors: focusing on the question of whether individuals who experienced a change in crime victimisation status between any pair of survey waves also experienced a change in their mental health score between the same pair of survey waves after adjusting for dynamic control variables.
2. Adjusted to account for the interaction between sex and victimisation: focusing on the question of whether there is a difference between males and females in terms of the impact that a change in crime victimisation status has on mental health scores after adjusting for dynamic control variables.

For each of the fixed effects models, robust 95 percent confidence intervals were estimated. Fixed effects model coefficients with a p-value of less than .05 indicate that the change in mental health scores associated with the change in the control variable (such as in victimisation status) is statistically significant.

RESULTS

SAMPLE CHARACTERISTICS

The sample pooled across the 2002 to 2011 survey years consisted of 110,671 records from 16,187 persons with between two and ten records per person. Of this pooled sample, 53.3 percent of the records were for females, 25 to 54 years was the most common age category (53.5%), only 8.8 percent indicated that they spoke a language other than English and 66.5 percent of records were for persons who had achieved an educational qualification of Year 11 or above.

Sample characteristics that may change over time and were used in the fixed effects modelling are presented in Table 1.

The majority of records were for persons who were:

- partnered (63.6%)
- from a major city (61.6%)
- employed (64.7%)
- easily able to raise emergency funds (58.2%)
- financially prosperous or comfortable (68.6%)
- consuming alcohol at low risk levels (63.9%)
- non-smokers (50.8%)
- exercising at a moderate or intensive level for 30 minutes or more at least once per week (73.6%)
- assessed as having adequate social networks (89.2%)
- assessed as having one or more life events in the past 12 months (50.9%).

The mean general health score was 68.9 (95% confidence interval (68.7, 70.0)).

Table 1. Characteristics of the survey cohort pooled across 2002 to 2011 (N=110,671 from 16,187 persons)

		n	Percent
Total		110671	100.0
Dynamic variables included in fixed effects models			
Partner status	Partnered	70,416	63.6
	Not partnered	40,224	36.4
	Missing	31	0.0
Area of residence	Major city	68,150	61.6
	Regional/remote	42,516	38.4
	Missing	5	0.0
Labour force status	Employed	71,652	64.7
	Unemployed	3,513	3.2
	Not in the labour force	35,506	32.1
Ability to get emergency funds	Could easily	64,351	58.2
	Could, but would involve some sacrifice	22,298	20.2
	Would have to do something drastic	9,818	8.9
	Could not	12,795	11.6
	Missing	1,409	1.3
Financial prosperity	Prosperous/very comfortable	18,133	16.4
	Reasonably comfortable	57,758	52.2
	Just getting along	30,308	27.4
	Poor/very poor	3,685	3.3
	Missing	787	0.7
Alcohol consumption	Low-risk drinker <12/wk	70,747	63.9
	Abstainer/ex-drinker	18,511	16.7
	Risky/high-risk drinker 12+/wk	20,063	18.1
	Missing	1,350	1.2
Smoking status	Non-smoker	56,264	50.8
	Ex-smoker	30,435	27.5
	Smoker	23,214	21.0
	Missing	758	0.7
Physical activity	Not at all	11,718	10.6
	Less than once a week	17,349	15.7
	1 to 2 times a week	26,417	23.9
	3 times a week	17,548	15.9
	More than 3 times a week	23,497	21.2
	Every day	13,905	12.6
	Missing	237	0.2
Mean social network score	1.000-1.999	34,272	31.0
	2.000-2.999	39,387	35.6
	3.000-3.999	25,043	22.6
	4.000-7.000 (inadequate)	11,440	10.3
	Missing	529	0.5
Number of life events	0	54,297	49.1
	1	35,055	31.7
	2	15,401	13.9
	3+	5,918	5.4
General health score (from SF-36)			Mean (95% CI)
	Valid	109,525	68.9 (68.7, 70.0)
	Missing	1,146	

Note. There are multiple records per person in this table and the number of records per person ranges from two to ten.

Table 2 presents the percentage of records across the survey years 2002 to 2011 where the respondent reported being a victim of physical violence and where the respondent reported being a victim of property crime. Across the 110,671 records from 2002 to 2011, there were 1,777 reports of violence victimisation (1.6%) and 5,068 reports of property crime victimisation (4.6%). Reports of violence and property crime were greatest in 2002 (2.0% for violence and 6.7% for property) and lowest in 2011 (1.3% for violence and 3.4% for property). The decline in property crime victimisation over the study period is consistent with recorded crime data (Australian Institute of Criminology, 2012).

ANALYSES OF TRANSITIONS FROM ONE YEAR TO THE NEXT

To examine the change in victimisation status from one survey year to the next, the results presented in Table 3 and Table 4 are restricted to the 87,978 records from 15,719 persons where consecutive survey years of data were available. These consecutive years are labelled 'year *t*' and 'year *t+1*', with *t* representing the initial survey year in the set of consecutive survey years. For example, if the initial survey year in the set is 2002 then *t* = 2002, and *t+1* = 2003. We would therefore be monitoring the change in victimisation status from 2002 to 2003. There may be up to nine sets of consecutive records per person (e.g., a person who participated in all waves from 2002 to 2011 would have comparisons for 2002-2003, 2003-2004, 2004-2005, 2005-2006, 2006-2007, 2007-2008, 2008-2009, 2009-2010, and 2010-2011).

Table 3 shows transitions in victimisation in the past 12 months for consecutive survey years. It can be seen that the vast majority of respondents were not a victim of either type of crime in year *t* (82,862 of the 87,978 respondents, 94.2%). Furthermore, 90.1 percent of the total sample did not report being a victim in either year *t* or in the subsequent year.

Table 2. Physical violence and property crime victimisation status in the past 12 months by survey years 2002 to 2011 (110,671 records from 16,187 persons)

Survey year	Number of records	Victim of physical violence		Victim of property crime	
		Number of victims	Percent of victims within year	Number of victims	Percent of victims within year
2002	10,856	218	2.0	726	6.7
2003	11,174	211	1.9	702	6.3
2004	10,925	174	1.6	581	5.3
2005	11,030	172	1.6	480	4.4
2006	11,256	189	1.7	555	4.9
2007	10,976	163	1.5	389	3.5
2008	10,696	180	1.7	410	3.8
2009	11,059	160	1.5	423	3.8
2010	11,593	167	1.4	425	3.7
2011	11,106	143	1.3	377	3.4
Pooled 2002 to 2011	110,671	1,777	1.6	5,068	4.6

Note. There are multiple records per person in this table and the number of records per person ranges from two to ten.

Table 3. Transitions in physical violence and property crime victimisation in past 12 months for consecutive survey years (year *t* and year *t+1*) (87,978 records from 15,719 persons)

		Reported being a victim at survey year <i>t+1</i> of:				
		Not violence & not property	Property but not violence	Violence but not property	Violence & property	Total
Reported being a victim at survey year <i>t</i> of:						
Not violence & not property	n	79,304	2,748	686	124	82,862
	% within row	95.7	3.3	0.8	0.2	100.0
	% of total	90.1	3.1	0.8	0.1	94.2
Property but not violence	n	3,062	627	49	38	3,776
	% within row	81.1	16.6	1.3	1.0	100.0
	% of total	3.5	0.7	0.1	0.0	4.3
Violence but not property	n	761	59	214	47	1,081
	% within row	70.4	5.5	19.8	4.4	100.0
	% of total	0.9	0.1	0.2	0.1	1.2
Violence & property	n	156	34	39	30	259
	% within row	60.2	13.1	15.1	11.6	100.0
	% of total	0.2	0.0	0.0	0.0	0.3
Total	n	83,283	3,468	988	239	87,978
	% of total	94.7	3.9	1.1	0.3	100.0

Note. To monitor change from one year to the next, only records where two consecutive waves of data were available were included, resulting in the exclusion of 22,693 records. There may be up to nine sets of records per persons (e.g., a person who participated in all waves from 2002 to 2011 would have comparisons for 2002-2003, 2003-2004, 2004-2005, 2005-2006, 2006-2007, 2007-2008, 2008-2009, 2009-2010 and 2010-2011).

Of the remaining respondents who were non-victims in year *t*, 3.3 percent reported being only a victim of a property crime the following year, less than 1 percent reported being only a victim of a violent crime the following year and a very small proportion (0.2%) reported being a victim of both a property and a violent crime.

An examination of respondents who reported being only a victim of property crime in year *t* shows that, while the majority were not a victim of either category of crime in the following year (81.1%), a substantial proportion (16.6%) reported being a victim of the same offence type as in year *t*. A similar pattern was found for respondents who reported being a victim of violent crime but not property crime in year *t*. Of this group, 70.4 percent were not a victim of either offence type the following year, but 19.8 percent reported being a victim of a violent offence but not a property offence in year *t+1*.

The largest change in victimisation status from year *t* occurred in the group who were a victim of both violent and property crime in year *t*. While only 259 of the total sample were victims of both

offence types in year *t*, 13.1 percent (34 respondents) were victims of property but not violent crime the following year, 15.1 percent (39 respondents) were a victim of violent but not property crime the following year, and 11.6 percent (30 respondents) were still a victim of both types of crime in the following year.

Table 3 also indicates that, while the vast majority of respondents were not a victim of crime in either year, a substantial proportion of those who were a victim of crime in one year, also experienced an incident of victimisation the following year. The repeat victimisation of respondents is particularly evident for respondents who were victims of violence. Of the 1,340 reports of violence in year *t* (including reports of violence only and reports of violence and property crime), 330 (24.6%) reported being a victim of violence the following year.⁵

Table 4 presents the mean SF-36 mental health scores in year *t* and year *t+1* and the difference in the means from year *t* to year *t+1* by transitions in crime victimisation status. These means are not adjusted for other relevant variables. Lower mental health scores represent poorer mental health and a decrease in mental health scores represents a worsening of mental health over time.

Table 4. Mean and mean difference (and 95% confidence interval) in SF-36 mental health scores by physical violence and property crime victimisation status in past 12 months for consecutive survey years (year *t* and year *t+1*) (87,978 records from 15,719 persons)

		Reported being a victim at survey year <i>t+1</i> of:			
		Not violence & not property	Property but not violence	Violence but not property	Violence & property
Reported being a victim at survey year <i>t</i> of:					
Not violence & not property	Year <i>t</i>	75.2 (75.1, 75.3)	73.4 (72.8, 74.0)	67.5 (66.1, 69.0)	63.6 (59.8, 67.4)
	Year <i>t+1</i>	75.1 (75.0, 75.3)	73.2 (72.6, 73.9)	64.3 (62.7, 65.8)	58.0 (54.3, 61.7)
	Difference (year <i>t+1</i> minus <i>t</i>)	-0.1 (-0.2, 0.0)	-0.2 (-0.7, 0.4)	-3.3 (-4.7, -1.9) ^a	-5.6 (-8.8, -2.5) ^a
Property but not violence	Year <i>t</i>	73.5 (72.9, 74.1)	70.0 (68.6, 71.4)	66.3 (61.1, 71.6)	56.0 (48.1, 63.9)
	Year <i>t+1</i>	73.6 (73.0, 74.2)	71.2 (69.8, 72.6)	57.6 (51.2, 64.0)	53.9 (46.5, 61.3)
	Difference (year <i>t+1</i> minus <i>t</i>)	0.2 (-0.3, 0.7)	1.2 (0.1, 2.3) ^b	-8.8 (-15.5, -2.0) ^a	-2.2 (-8.2, 3.8)
Violence but not property	Year <i>t</i>	64.4 (62.9, 65.9)	60.5 (55.0, 66.0)	56.2 (52.9, 59.4)	53.3 (47.2, 59.3)
	Year <i>t+1</i>	67.0 (65.6, 68.4)	62.6 (57.7, 67.6)	55.4 (52.3, 58.5)	56.0 (49.3, 62.7)
	Difference (year <i>t+1</i> minus <i>t</i>)	2.6 (1.2, 4.0) ^b	2.2 (-2.6, 7.0)	-0.7 (-3.4, 1.9)	2.7 (-2.5, 7.9)
Violence & property	Year <i>t</i>	59.4 (56.1, 62.8)	51.4 (43.9, 58.8)	55.9 (48.9, 62.9)	46.0 (37.2, 54.9)
	Year <i>t+1</i>	65.3 (62.3, 68.3)	50.7 (43.5, 57.9)	60.0 (52.6, 67.4)	44.1 (35.0, 53.2)
	Difference (year <i>t+1</i> minus <i>t</i>)	5.8 (3.0, 8.7) ^b	-0.7 (-7.0, 5.7)	4.1 (-0.7, 9.0)	-1.9 (-8.9, 5.1)

Note. Lower mental health scores indicates poorer mental health. To monitor change from one year to the next, only records where two consecutive waves of data were available were included, resulting in the exclusion of 22,693 records. There may be up to nine sets of records per persons (e.g., a person who participated in all waves from 2002 to 2011 would have comparisons for 2002-2003, 2003-2004, 2004-2005, 2005-2006, 2006-2007, 2007-2008, 2008-2009, 2009-2010 and 2010-2011).

^a Paired t-test p-value was less than .05 and there was a statistically significant decrease in mental health scores from year *t* to year *t+1* surveys.

^b Paired t-test p-value was less than .05 and there was a statistically significant increase in mental health scores from year *t* to year *t+1* surveys.

An examination of mean mental health scores for persons who were non-victims in year t shows that persons who became a victim of violent crime in year $t+1$ already had lower mental health scores than persons who remained non-victims in year $t+1$ (year t mean score 63.6 for victims of violence and property crime in year $t+1$; year t mean score 67.5 for victims of violence but not property crime in year $t+1$; year t mean score 75.2 for non-victims in year $t+1$).

Persons who remained non-victims in year t and the following year (year $t+1$) had little change in their mental health scores (mean change -0.1, 95% CI (-0.2, 0.0)). Similarly, there was no significant change in mental health scores for persons who were non-victims in year t but a victim of property crime the following year (mean change -0.2, 95% CI (-0.7, 0.4)). By contrast, persons who were non-victims in year t had a significant decline in their mental health if they were a victim of violent crime in the next year, either with property crime (mean change -5.6, 95% CI (-8.8, -2.5)) or without property crime (mean change -3.3, 95% CI (-4.7, -1.9)). Persons who reported being a victim of property but not violent crime at year t had a significant decline in their mental health if they were a victim of violent crime but not property crime in the next year (mean change -8.8, 95% CI (-15.5, -2.0)) and a small improvement if they remained a victim of property but were not a victim of violent crime in the next year (mean change 1.2, 95% CI (0.1, 2.3)).

Persons who reported being a victim of violent crime only at year t had a significant improvement in their mental health if they were a victim of neither violent nor property crime in the following year (mean change 2.6, 95% CI (1.2, 4.0)). Persons who reported being a victim of both violent and property crime at year t had a significant improvement in their mental health if they were not a victim of violent or property crime in the following year (mean change 5.8, 95% CI (3.0, 8.7)).

Fixed effects models

The results presented in the previous section examined the relationship between change in mental health and change in victimisation status across consecutive pairs of survey waves, but did not control for any characteristics that may be related to changes in mental health. An advantage of fixed effects regression is that, in addition to being able to control for time-stable and time-changing control variables, changes in data between any pair of survey waves (referred to as year i and year j) can be modelled. As such, the analysis in this section uses the full study sample (110,671 records from 16,187 persons).

The first step of the analysis involved constructing a fixed effects model predicting change in mental health score between any pair of survey waves by change in victimisation status between

the same pair of survey waves, without including any additional control variables. This unadjusted fixed effects model controlled for all possible time-stable factors because it compared changes within the same individual over time. At this preliminary stage, the model showed that persons who were non-victims in one year (year i) but a victim of violent crime in a subsequent year (year j) had a significant decline in their mental health. For persons who were non-victims in one year (year i) but a victim of property crime in a subsequent year (year j) there was no significant change in their mental health. Detailed results for the unadjusted fixed effects can be found in the Appendix (Table A2). The second step of the analysis was to add a set of measured dynamic control factors. The dynamic control factors included in this model were: partner status, area of residence, labour force status, financial prosperity, ability to raise funds in an emergency, alcohol consumption, smoking status, physical activity, general health, social networks and number of life events. Table 5 summarises the results of the fixed effects model predicting change in mental health score by change in victimisation status while controlling for all time-stable characteristics and for the set of measured dynamic factors listed previously.

To summarise, the fixed effects model showed that, even after controlling for other relevant characteristics, respondents report a significant decline in their mental health if they changed from:

- not being a victim of either violent or property crime in one year (year i) to:
 - being a victim of violent but not property crime in a subsequent year (year j) (coefficient -3.6, 95% CI (-4.5, -2.7)), or
 - being a victim of both violent and property crime in a subsequent year (year j) (coefficient -4.3, 95% CI (-5.9, -2.7));
- being a victim of property but not violent crime in one year (year i) to:
 - being a victim of violent crime only in a subsequent year (year j) (coefficient -3.4, 95% CI -4.4, -2.4)), or
 - being a victim of both violent and property crime in a subsequent year (year j) (coefficient -4.1, 95% CI (-5.7, -2.5)).

However, property crime victimisation does not appear to have as much of an impact on an individual's mental health as violent crime victimisation. Holding all other characteristics constant, respondents report no significant change in mental health if they changed from:

- not being a victim of either crime in one year (year i) to being a victim of property crime only in a subsequent year (year j) (coefficient -0.2, 95% CI (-0.6, 0.1));

Table 5. Fixed effects regression victimisation coefficients (and 95% confidence intervals) for model predicting change in SF-36 mental health scores from the change in physical violence and property crime victimisation status in past 12 months between survey years *i* and *j* controlling for dynamic factors (105,446 records from 16,146 persons)

	Reported being a victim at survey year <i>j</i> of:			
	Not violence & not property	Property but not violence	Violence but not property	Violence & property
Reported being a victim at survey year <i>i</i> of:				
Not violence & not property	– ^a	-0.2 (-0.6, 0.1)	-3.6 (-4.5, -2.7) ^b	-4.3 (-5.9, -2.7) ^b
Property but not violence	–	– ^a	-3.4 (-4.4, -2.4) ^b	-4.1 (-5.7, -2.5) ^b
Violence but not property			– ^a	-0.7 (-2.5, 1.0)
Violence & property				– ^a

Note. Lower mental health scores indicate poorer mental health. All records were included for persons with two or more survey years of not necessarily consecutive data. Dynamic controls included are: partner status, area of residence, labour force status, ability to raise funds in an emergency, financial prosperity, alcohol consumption, smoking status, physical activity, general health score, social networks and number of life events. Lower mental health scores indicates poorer mental health. The 5,225 records with missing information for at least one of the control variables were excluded from the model.

^a Not applicable as no change in victimisation status.

^b Fixed effects coefficient p-value was less than .05 and there was a statistically significant decrease in mental health scores associated with the change in victimisation status.

- being a victim of violent but not property crime in one year (year *i*) to being a victim of both violent and property crime in a subsequent year (year *j*) (coefficient -0.7, 95% CI (-2.5, 1.0)).

The inclusion of the dynamic control variables in the fixed effects model was largely consistent with the outcome of the unadjusted model, however the inclusion of the control variables reduced the size of declines in mental health that were observed in the unadjusted model.⁶ It is also interesting to note the significant relationships between changes in the control variables included in the fixed effects models and changes in mental health scores. Details of the fixed effects control variable coefficients can be found in the Appendix (Table A3). To summarise these findings, mental health scores improved for persons who:

- improved their physical health;
- moved from a major city to a regional or remote area; and/or
- changed from never exercising for at least 30 minutes per week to exercising for at least 30 minutes.

Mental health declined for persons who:

- changed from being partnered to not partnered;
- changed from being employed to unemployed or not in the labour force;
- changed from being easily able to raise emergency funds to less able to raise emergency funds;
- changed from being financially prosperous/comfortable to less financially prosperous;

- changed from never having been a smoker to being a current smoker;
- had a decrease in their social support networks; and/or
- changed from zero to one or more life events in the past year.

Interaction between crime victimisation and sex

Table 6 presents a summary of the results of the adjusted fixed effects model predicting change in mental health score by change in victimisation status after including an interaction term for victimisation by sex. Variables adjusted for in this extended model included partner status, area of residence, labour force status, ability to raise funds in an emergency, financial prosperity, alcohol consumption, smoking status, physical activity, general health score, social networks and number of life events.

The results of this extended model (see Table 6) show that, holding all other characteristics constant, females report a larger decrease in their mental health scores than males if they changed from being a non-victim in one year (year *i*) to being a victim of violent crime in a subsequent year (year *j*), regardless of whether or not they also report being a victim of property crime in year *j*.

Holding all other characteristics constant, females also had a larger decrease in their mental health scores than males if they changed from reporting being a victim of property crime but not of violent crime in one year (year *i*) to being a victim of violent crime but not of property crime in a subsequent year (year *j*). (See Appendix Table A4 for the results of the coefficients of this adjusted fixed effects model).

Table 6. Summary of difference in fixed effects regression coefficients between males and females for adjusted model predicting change in SF-36 mental health scores from the change in physical violence and property crime victimisation status in past 12 months between survey years *i* and *j*, controlling for dynamic factors (105,446 records from 16,146 persons)

	Reported being a victim at survey year <i>j</i> of:			
	Not violence & not property	Property but not violence	Violence but not property	Violence & property
Reported being a victim at survey year <i>i</i> of:				
Not violence & not property	– ^a	No difference	Larger decrease for females ^b	Larger decrease for females ^b
Property but not violence		– ^a	Larger decrease for females ^b	No difference
Violence but not property			– ^a	No difference
Violence & property				– ^a

Note. Lower mental health scores indicate poorer mental health. All records were included for persons with two or more survey years of not necessarily consecutive data. Dynamic controls included are: partner status, area of residence, labour force status, ability to raise funds in an emergency, financial prosperity, alcohol consumption, smoking status, physical activity, general health score, social networks and number of life events. The 5,225 records with missing information for at least one of the control variables were excluded from the model.

^a Not applicable as no change in victimisation status.

^b Fixed effects interaction coefficient *p*-value was less than .05 and the decline in mental health scores associated with the change in victimisation status was significantly greater for females than for males.

DISCUSSION

This study primarily set out to answer three questions:

1. Does becoming a victim of crime affect the victim’s mental health?
2. Is the effect of crime victimisation on mental health different for victims of property crime and violent crime?
3. Is the effect of crime victimisation on mental health different for male and female victims?

The results provide strong evidence that being a victim of violent crime has a negative effect on mental health. The fixed effects models demonstrate that victims of violence suffered significant reductions in their mental health following their experience of crime that could not be attributed to pre-existing time-stable factors (such as a history of child abuse) or the dynamic factors included in the model. Conversely, for victims of property crime, there was no statistically significant change in their mental health following their experience of the crime once other relevant time-stable and dynamic factors were controlled for.

Examining gender differences, we found that becoming a victim of violent crime has a significant and negative impact on the mental health of both males and females; and further, that the effect of violent victimisation is more pronounced for females. There was no evidence that becoming a victim of property crime had any detectable impact on mental health for either females or males.

The findings of the current study are largely consistent with previous research conducted in this area. Past studies using cross-sectional designs have clearly demonstrated an

association between being a victim of violent crime and poor mental health. The current study, using longitudinal data and controlling for a wide range of potentially confounding variables, builds on past research by providing evidence of a causal relationship between these two variables. We can now be more confident in concluding that the trauma of being a victim of violent crime leads to significant declines in mental health. Our study also supports the findings of international research, which show that violent crime has a more severe and persistent effect on victims’ mental health than property crime (Norris & Kaniasty, 1994).

The limitations of our study need to be acknowledged and offer opportunities for future research. Firstly, while we did not detect a significant decline in mental health following an episode of property crime, this may be due to insufficient power to detect change. Although the HILDA sample is derived from a large national survey, and the analytical technique was chosen to maximise the number of records included in the study, the number of victims, and therefore the number of transitions in victimisation status between consecutive years, was relatively small. Secondly, there may be an effect of property crime on mental health immediately following the incident, but this effect may dissipate more quickly than for victims of violence. In the HILDA survey, respondents were asked about property crime victimisation during the 12 months prior to the interview, but were asked about their mental state in the four weeks preceding the interview. It should be noted that respondents to the HILDA survey were asked to nominate when in the past 12 months victimisation occurred using three-month intervals (e.g., 0-3 months ago, 4-6 months ago). Examination of the

data revealed that a disproportionate number of respondents indicated that the incident occurred in the three months prior to their interview, suggesting a bias in estimating the timing of the event, rendering this estimate unsuitable for use in our analysis. Had we been able to assess mental health soon after the property crime occurred, we may have detected a significant change in victims' mental health over the short-term. This would be consistent with the findings by Denkers and Winkel (1998) that victims of property crime suffer an immediate deterioration in their emotional state following their victimisation, but appear to recover within a month of the incident. Thirdly, property crime incorporates a broad range of offences, from theft of a personal item in a public space to home burglary. It is possible that some of these crimes (e.g., those which are perceived as more invasive, such as burglary) have an impact on an individual's mental health while others have no discernable effect. We were unable to explore these differences in the current study because data on the type of property crime a victim experienced were not collected in the HILDA survey. Fourthly, even if it has no effect on mental health, being a victim of property crime can have significant financial effects.

The findings relating to victims of violence also require discussion. The results of the current study show a pattern of repeat victimisation among a small group of respondents. While the proportion of respondents reporting any incident of violence was very low, one in five respondents who were a victim of violent crime in one year were also a victim of violence the following year. This finding of multiple victimisation for victims of violence is consistent with past research showing that victimisation is not randomly distributed among the population (Farrell, 1992; Mukherjee & Carcach, 1998), but that individuals who have experienced an incident of violence are at greater risk of experiencing further incidents of violence.

The results also indicate that victims of violent crime had substantially lower mental health scores than non-victims, even in the year prior to their victimisation. This finding supports the notion that differences between victims and non-victims exist prior to victimisation, however, the study provides evidence of declines in mental health following an experience of violence, regardless of pre-existing mental health issues. It is important to note that mental health scores may have been affected by victimisation prior to the reference period of the survey. Given that a substantial proportion of victims in the study were victimised in more than one year, it is possible that the mental health of respondents who were classified as transitioning from 'non-victim' in one year to 'victim' in the following year had experienced unrecorded incidents of past violence that may have affected their mental health.

In acknowledging the limitations of this study we also recognise that, while the range of dynamic factors controlled for in this

study was extensive, it was not exhaustive. Therefore we cannot rule out the possibility that some of the change in mental health scores that was attributed to being a victim of violence was due, in part, to some other unidentified time-variant factor, or the quality of measures used for the control variables included in the analysis.

Also worth noting is the comparatively small proportion of HILDA respondents who reported being a victim of violent crime. Only 1.6 percent of the pooled HILDA sample reported being a victim of violence. In the national victimisation survey conducted by the Australian Bureau of Statistics, 3.0 percent of respondents reported being a victim of a physical assault and 3.7 percent reported being a victim of a threatened assault (Australian Bureau of Statistics, 2013). The discrepancy between these two data sources could lie in the methodologies used to gather the data and in the terminology used during data collection. The victimisation data collected by the ABS is obtained as part of a personal interview usually conducted by trained interviewers over the telephone. The ABS survey asks respondents about physical assault, threatened assault, robbery and sexual assault, and provides definitions of each of these offence types and examples. For physical assault, the examples range from being pushed or slapped to being beaten or stabbed. By contrast, the victimisation data obtained in the HILDA survey were part of a self-completion questionnaire and contained very limited explanation of what constitutes physical violence, citing 'assault' as the only example of violence.

Additional health measures are also needed to examine other aspects of mental health that may be affected by victimisation. The finding of a greater decline in the mental health of female victims of violence compared with males may reflect the greater propensity for women to experience anxiety and mood disorders (Slade et al., 2009). It is possible that the effect of being a victim of violence results in problems for men that were not examined in the current study. Given that men are more likely than women to engage in substance use (Slade et al., 2009), it would be worthwhile examining the relationship between victimisation and substance abuse. However, HILDA data does not contain an adequate measure of substance use to examine this issue.

An alternative explanation for the gender difference observed in this study is the context in which violence incidents are experienced by male and female victims. Australian victim surveys show that, while the victimisation rate for physical assault is higher for males than females, males are more likely to be assaulted by a stranger, whereas the majority of female victims are assaulted by someone they know, with the most common location of the assault being their own home (ABS, 2013). Further research investigating the context of violence and its effect on mental health would not only improve our understanding of the relationship between victimisation and mental health, but also our response to victims.

Another important consideration that warrants future investigation is the effect recurrent, violent trauma, as distinct from isolated incidents of violence, has on mental health. Previous research suggests that exposure to multiple incidents of violence, and multiple forms of violence, increases the risk of mental health impairment (Hedtke et al., 2008; Higgins & McCabe, 2001). This issue is particularly salient for victims of IPV, given that they commonly experience ongoing abuse involving multiple forms of violence (Mouzos & Makkai, 2004). However, due to limitations of the HILDA data we were unable to identify the duration, type or intensity of the violence experienced by study respondents.

Clearly, there are many questions relating to victimisation in Australia that are not yet fully understood and are yet to be explored. The HILDA survey offers unique opportunities to conduct longitudinal analysis on a vast array of issues related to victimisation, however its potential as a data collection instrument is currently underutilised. Greater clarity is needed in the definition of offence types to provide consistent and reliable data. More detailed information is required on the nature and severity of crimes, the relationship between victim and offender, and how recently an incident occurred.

With these limitations in mind, what are the implications of the current study for the provision of services to victims of crime? Firstly, this study provides strong evidence that becoming a victim of violent crime can have a measurable impact on mental health. Offering support to victims to address the physical and emotional aspects of harm arising from their victimisation is therefore appropriate. While victim support services in Australia have embraced the need to provide psychological support to victims of crime, the challenge for service providers is how to reach out and engage with individuals who may be experiencing difficulties after becoming a victim of crime. The police are one potential source of information on the availability and accessibility of victim support services but only 50 percent of victims of assault and 30 percent of victims of sexual assault report the crime to police (ABS, 2013; Birdsey & Snowball, 2013). This suggests that information about victim support services may need to be distributed through additional channels, such as, general practitioners, psychologists and community health workers. This approach requires broadening the way victimisation is conceptualised, from a criminal justice problem to a wider public health issue. Health workers, who may be the first point of contact for many victims presenting with mental health issues, need to be able to identify victims and refer them to available resources. It is also important to ensure accessibility to marginalised sections of the community who may be unaware of victims' rights and services or reluctant to engage with services associated with the criminal justice system. Finally, it is imperative that victims of violence seeking support services are able to access interventions that are evidence-based and effective.

ACKNOWLEDGEMENTS

This research was made possible due to funding provided by Victim Services, NSW Department of Attorney General and Justice.

This paper uses unit record data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey. The HILDA Project was initiated and is funded by the Australian Government Department of Social Services (DSS) and is managed by the Melbourne Institute of Applied Economic and Social Research (Melbourne Institute). The findings and views reported in this paper, however, are those of the authors and should not be attributed to either DSS or the Melbourne Institute.

The authors would like to thank Suzanne Poynton, Don Weatherburn, Clare Ringland and Florence Sin for their assistance and the anonymous external reviewers for providing feedback on the bulletin.

NOTES

1. Externalising disorders are manifested in a person's outward behaviour whereas internalising disorders are manifested in a person's thoughts and feelings.
2. A top-up sample was introduced in 2011 but was not included in the current study as there are no longitudinal data available for the top-up sample at this time.
3. SF-36 Standard English (Australian/New Zealand) Version 1.0 © 1994 Medical Outcome Trust.
4. The statistical analyses presented in the current study do not take into account HILDA's sample design characteristics (e.g., stratum and cluster) or weights. Therefore, percentages presented are not nationally representative of Australian residents but rather reflect the current study samples.
5. As no details of the incident of crime are recorded in HILDA it is not possible to determine if subsequent violent incidents involved the same perpetrator as previous incidents.
6. Fixed effects models were also constructed for the role emotional and social functioning subscales of the SF-36. The results are not reported as the findings are largely consistent with the findings of the model for the mental health subscale.

REFERENCES

- Afifi, T., MacMillan, H., Cox, B.J., Asmundson, G.J.G., Stein, M.B., & Sareen, J. (2009). Mental health correlates of intimate partner violence in marital relationships in a nationally representative sample of males and females. *Journal of Interpersonal Violence, 24*(8), 1398-1417.
- Allison, P. (2009). *Fixed effects regression models* (Quantitative Application in the Social Sciences No. 160). California, USA: Sage Publications, Inc.
- Australian Bureau of Statistics. (2013). *Crime Victimization Australia, 2011-12*. (Cat. No. 4530.0) Retrieved from <http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/4530.0Chapter1002011-12>
- Australian Institute of Criminology. (2012). *Australian Crime: Facts & Figures, 2011*. Retrieved from: <http://www.aic.gov.au/documents/0/B/6/%7B0B619F44-B18B-47B4-9B59-F87BA643CBAA%7Dfacts11.pdf>
- Birdsey, E., & Snowball, L. (2013). *Reporting Violence to Police: a survey of victims attending domestic violence services*. (Crime and Justice Statistics, Bureau Brief, No. 91). Retrieved from NSW Bureau of Crime Statistics and Research website: http://www.bocsar.nsw.gov.au/agdbasev7wr/_assets/bocsar/m71685414/bb91.pdf
- Bonomi, A.E., Thompson, R.S., Anderson, M., Reid, R.J., Carrell, D., Dimer, J. A., & Rivara, F.P. (2006). Intimate partner violence and women's physical, mental, and social functioning. *American Journal of Preventative Medicine, 30*, 458-466.
- Britt, C.L. (2001). Health consequences of criminal victimization. *International Review of Victimology, 8*, 63-73.
- Brown, C., Madden, P., Palenchar, D., & Cooper-Patrick, L. (2000). The association between depressive symptoms and cigarette smoking in an urban primary care sample. *International Journal of Psychiatry and Medicine, 30*(1), 15-26.
- Chuang, C.H., Cattoi, A.L., McCall-Hosenfeld, J.S., Camacho, F., Dyer, A., & Weisman, C. (2012). Longitudinal association of intimate partner violence and depressive symptoms. *Mental Health in Family Medicine, 9*, 107-114.
- Coker, A.L., Davis, K.E., Arias, I., Desai, S., Sanderson, M., Brandt, H.M., & Smith, P.H. (2002). Physical and mental health effects of intimate partner violence for men and women. *American Journal of Preventive Medicine, 24*, 260-268.
- Cook, B., David, F., & Grant, A. (1999). *Victims' needs, victims' rights: policies and programs for victims of crime in Australia* (Research and Public Policy Series No. 19). Canberra: Australian Institute of Criminology.
- Cornaglia, F., & Leigh, A. (2011). *Crime and mental wellbeing* (Centre for Economic Performance Discussion Paper No. 1049). Retrieved from Centre for Economic Performance, London School of Economics and Political Science, University of London website: <http://cep.lse.ac.uk/pubs/download/dp1049.pdf>
- Denkers, A., & Winkel, F. (1998). Crime victims' wellbeing and fear in a prospective and longitudinal study. *International Review of Victimology, 5*, 93-140.
- Derogatis, L.R., & Spencer, P.M. (1982). *Administration and procedures: BSI. Manual I*. Baltimore, MD: Clinical Psychometric Research.
- Farrell, G. (1992). Multiple victimisation: Its extent and significance. *International Review of Victimology, 2*, 85-102.
- Fletcher, J. (2010). The effects of intimate partner violence on health in young adulthood in the United States. *Social Science and Medicine, 70*, 130-135.
- Glass, T.A., De Leon, C.F., Bassuk, S.S., & Berkman, L.F. (2006). Social engagement and depressive symptoms in late life: longitudinal findings. *Journal of Aging and Health, 18*(4), 604-28.
- Hassmen, P., Koivula, N., & Uutela, A. (2000). Physical exercise and psychological well-being: a population study in Finland. *Preventive Medicine, 30*(1), 17-25.
- Hedtke, K.A., Ruggiero, K.J., Fitzgerald, M.M., Zinzow, H. M., Saunders, B.E., Resnick, H.S., & Kilpatrick, D. G. (2008). A longitudinal investigation of interpersonal violence in relation to mental health and substance use. *Journal of Consulting and Clinical Psychology, 76* (4), 633-647.
- Hegarty, K., Gunn, J., Chondros, P., & Small, R. (2004). Association between depression and abuse by partners of women attending general practice: descriptive, cross sectional survey. *British Medical Journal, 13*, 621-624.
- Higgins, D. J., & McCabe, M. P. (2001). Multiple forms of child abuse and neglect: Adult retrospective reports. *Aggression and Violent Behavior, 6*, 547-578.
- Kendler, K.S., Karkowski, L.M., & Prescott, C.A. (1999). Causal relationship between stressful life events and the onset of major depression. *American Journal of Psychiatry, 156*(6), 837-41.
- Kessler, R. C. (1997). The effects of stressful life events on depression. *Annual Review of Psychology, 48*, 191-214.
- Kilpatrick, D.G., Ruggiero, K. J., Acierno, R., Saunders, B., Resnick, H., & Best, C. (2003). Violence and risk of PTSD, major depression, substance abuse/dependence, and co-morbidity: results from the National Survey of Adolescents. *Journal of Consulting and Clinical Psychology, 71*(4), 692-700.

- Kunst, M., & Van Wilsem, J. (2013). Trait impulsivity and change in mental health problems after violent crime victimization: a prospective analysis of the Dutch longitudinal internet studies for the social sciences database. *Journal of Interpersonal Violence, 28*(8), 1642-1656.
- McHorney, C., Ware, J., & Raczek, A. (1993). The MOS 36-Item Short-Form Health Survey (SF-36): II. Psychometric and clinical tests of validity in measuring physical and mental health constructs. *Medical Care, 31*(3), 247-263.
- McHorney, C., Ware, J., Lu, J., & Sherbourne, C. (1994). The MOS 36-item Short-Form Health Survey (SF-36): III. Tests of data quality, scaling assumptions, and reliability across diverse patient groups. *Medical Care, 32*, 40-66.
- Mouzos, J. & Makkai, T. (2004). *Women's experiences of male violence: findings from the Australian component of the International Violence Against Women Survey (IVAWS)* (Research and Public Policy Series No. 56). Retrieved from Australian Institute of Criminology website: <http://www.aic.gov.au/documents/5/8/D/%7B58D8592E-CEF7-4005-AB11-B7A8B4842399%7DRPP56.pdf>
- Mukherjee, S., & Carcach, C. (1998). *Repeat Victimization in Australia* (Research and Public Policy Series No. 15). Canberra: Australian Institute of Criminology.
- Norris, F. H., & Kaniasty, K. (1994). Psychological distress following criminal victimization in the general population: Cross-sectional, longitudinal, and prospective analyses. *Journal of Consulting and Clinical Psychology, 62*(1), 111-123.
- Pimlott-Kubiak, S. & Cortina, L.M. (2003). Gender, victimisation and outcomes: reconceptualizing risk. *Journal of Consulting and Clinical Psychology, 71*(3), 528-539.
- Rees, S., Silove, D., Chey, T., Ivancic, L., Steel, Z., Creamer, M., Teesson, M., Bryant, R., McFarlane, A., Mills, K., Slade, T., Carragher, N., O'Donnell, M., & Forbes, D. (2011). Lifetime prevalence of gender-based violence in women and the relationship with mental disorders and psychological function. *Journal of the American Medical Association, 306*(5), 513-521.
- Resnick, H., Acierno, R., & Kilpatrick, D. (1997). Health impacts of personal violence. 2: Medical and mental health outcomes. *Behavioral Medicine, 23*, 65-78.
- Scott, K., Smith, D., & Ellis, P. (2010). Prospectively ascertained child maltreatment and its association with DSM-IV mental disorders in young adults. *Archives of General Psychiatry, 67*(7), 712-719.
- Shapland, J., & Hall, M. (2007). What do we know about the effects of crime on victims? *International Review of Victimology, 14*, 175-217.
- Slade, T., Johnston, A., Teesson, M., Whiteford, H., Burgess, P., Pirkis, J., & Saw, S. (2009). *The Mental Health of Australians 2. Report on the 2007 National Survey of Mental Health and Wellbeing*. Retrieved from Department of Health and Ageing website: [http://www.health.gov.au/internet/main/publishing.nsf/content/A24556C814804A99CA257BF0001CAC45/\\$File/mha2cov.pdf](http://www.health.gov.au/internet/main/publishing.nsf/content/A24556C814804A99CA257BF0001CAC45/$File/mha2cov.pdf)
- Smit, F., Beekman, A., Cuijpers, P., de Graaf, R., & Vollebergh, W. (2004). Selecting key variables for depression prevention: results from a population-based prospective epidemiological study. *Journal of Affective Disorders, 81*(3), 241-9.
- Sullivan, L., Fiellin, D., & O'Connor, P. (2005). The prevalence and impact of alcohol problems in major depression: a systematic review. *American Journal of Medicine, 118*(4), 330-341.
- Summerfield, M., Dunn, R., Friedin, S., Hahn, M., Ittak, P., Kecmanovic, M., Li, N., Macalalad, N., Watson, N., Wilkins, R., & Wooden, M. (2012). *HILDA User Manual – Release 11*. Retrieved from the HILDA, Melbourne Institute of Applied Economic and Social Research, website: http://www.melbourneinstitute.com/downloads/hilda/User%20Manual/HILDA%20User%20Manual%20Release_11.0.pdf
- Victims Services (2012). *Victims Compensation Tribunal New South Wales. Chairperson's Report 2011/2012*. Retrieved from Victims Services, Department of Attorney General and Justice website: http://www.victimsservices.lawlink.nsw.gov.au/vss/vs_formsreports.html
- Ware, J., & Sherbourne, C. (1992). The MOS 36-item short-form health survey (SF-36): I. Conceptual framework and item selection. *Medical Care, 30*(6), 473-483.
- Weich, S., & Lewis, G. (1998). Poverty, unemployment, and common mental disorders: population based cohort study. *British Medical Journal, 317*, 115-119.
- Willitts, M., Benzeval, M., & Stansfeld, S. (2004). Partnership history and mental health over time. *Journal of Epidemiology and Community Health, 58*(1), 53-58.

APPENDIX

Further details on the study design and analysis are available electronically at www.bocsar.nsw.gov.au