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Personal stress, financial stress, social support and women's experiences of physical violence: A longitudinal analysis

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Aim: *To determine whether higher levels of personal and financial stress and/or lower levels of social support at one point in time are associated with a higher risk of experiencing physical violence at a later point in time.*

Method: *Logistic generalized estimating equations (GEE) and fixed effects modelling were used to examine the effect of personal stress, financial stress and social support on self-reported experiences of physical violence in the past year. The sample pooled 48,368 records from 9,393 women aged 15 years or more who participated in at least one wave of the Australian Household, Income and Labour Dynamics (HILDA) survey between 2002 and 2009. Alcohol consumption, age, marital status and whether pregnant in the previous year were controlled for in the analyses.*

Results: *Women were more likely to have experienced physical violence if they reported personal or financial stress, poor social networks, heavy alcohol consumption, were not married (or widowed) or were young. These associations held up both cross-sectionally and longitudinally. Changes in personal stress, financial stress and partner status were also found to be associated with changes in the risk of experiencing physical violence.*

Conclusion: *Measures that reduce personal and financial stress or increase social support may help reduce the risk of women experiencing physical violence.*

Keywords: *violence against women, female violence, financial stress, personal stress, social support, longitudinal studies*

INTRODUCTION

More than 200,000 women in Australia aged 15 or more are assaulted every 12 months (Australian Bureau of Statistics, 2012). More than 100 women fall victim to homicide in Australia every year. The majority of these assaults and homicides are committed by persons known to the victim (e.g. intimate partners, parents or other family members) (Australian Bureau of Statistics, 2012; Virueda & Payne, 2010). Stress and frustration have long been thought to be important factors in aggression (Dollard et al., 1939; Berkowitz, 1989; Linsky et al., 1995). In their pioneering work on family violence, Straus and Gelles (1990) asked 8,145 families a series of questions bearing on possible sources of stress in their lives, including financial concerns, unemployment, serious illness and pregnancy. Higher levels of stress were found to be associated with higher rates of spousal violence, particularly where the source of the stress was financial and the male partner held the view that violence toward a female partner is legitimate or that husbands should 'have the final say' (Straus & Gelles, 1990, pp. 192-194). More recent studies have found similar results, even after controlling for a wide range of other important predictors of violence against women, including age, drug and alcohol abuse, marital status and personal autonomy (Benson et al., 2003; Cunradi et al., 2002; Fox, Benson, DeMaris, & Van Wyk, 2002; Lauritsen & Schaum, 2004; MacMillan & Gartner, 1999; Spriggs, Halpern, Herring & Schoenbach, 2009; Van Wyk et al., 2003).

The relationship between stress and violence toward women, however, has not always been clear or consistent. MacMillan and Gartner (1999) found that women's labour force participation lowered the risk of spousal abuse when their male partners were also employed but increased the risk when their male partners were not employed. Johnson et al. (2010) found that low income predicted violence but the effect disappeared in a multivariate analysis controlling for respondent age, heavy drinking by male partners, partner's use of violence outside the home, partner's controlling or emotionally abusive behaviour

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and victim experience of physical abuse as a child. Julian and McKendry (1993) found no relationship between household income and violence when comparing a sample of 42 male 'wife batterers' with a sample of 50 non-violent men. Mouzos and Makkai (2004), using Australian data from the International Violence Against Women Survey (IVAWS) found no relationship between violence and either (victim or offender) unemployment or household income. Johnson et al.'s (2010) analysis of the full IVAWS dataset revealed that the association between household income and violence held for some countries and not others.

Weatherburn (2011) suggested several possible reasons for the inconsistent results obtained in studies of the relationship between financial stress and violence against women. One limitation in many of the studies conducted so far is that they have tended to measure financial stress via household income or employment status. In doing so, they tacitly assume that individuals on lower incomes and those who are unemployed experience more financial stress than those who are on higher incomes or who have a job. This may be true as a rough generalisation but the level of financial stress experienced by an individual depends not just on their income but also on their financial commitments and liabilities. A sole parent with two children and an income of $20,000 is likely to experience a great deal more financial stress than a person on the same income who lives with her parents and has no children. As Fox et al. (2002) point out, the adequacy of income is more a function of the income-to-needs ratio than a simple function of income. Measures of income which do not take into account expenditure or financial commitments may fail to pick up the effects of financial stress.

A second limitation in past studies of the relationship between stress and violence is that income is sometimes entered into the regression analysis as a continuous variable. This implicitly assumes that the relationship between income and the probability of violence is linear. There is good reason to doubt this. Benson et al. (2003) grouped respondents from the US National Survey of Families and Households into quartiles based on their score on a general disadvantage index. Over the first three quartiles there was no relationship between disadvantage and violence. In the last quartile, the rate of violence nearly doubled. They also compared objective and subjective measures of financial strain. Objective stress was measured by computing the ratio of household income to the poverty line. Subjective stress was measured by asking respondents whether they were satisfied with their finances and how often they worry about their income. When subjective and objective financial stress measures were included in a multivariate analysis controlling for age, education, alcohol/drug problems and social support, the objective measures ceased to be significant predictors of violence. The subjective measure, however, remained highly significant. This suggests that financial stress ought to be measured either subjectively or in terms reflective of the gap between income and expenditure. It also suggests that the effects of income on violence are likely to be concentrated in the tail of the income distribution.

Weatherburn (2011) used the General Social Survey (GSS) (Australian Bureau of Statistics, 2006) to examine the relationship between stress and violence against women in a large representative sample of Australian women. The GSS measures financial stress by asking respondents a series of questions about what it calls 'cashflow' and/or what it calls 'dissaving' problems. Under the heading of 'cashflow' problems, respondents were asked whether (in the last 12 months) they had difficulties paying electricity, gas or telephone bills on time, paying mortgage or rent payments on time, paying for car registration or insurance on time, or making minimum payments on credit cards; whether (in the last 12 months) they had pawned or sold something because cash was needed; gone without meals; been unable to heat their home; sought financial help from friends or family; and/or sought assistance from welfare/community organisations. Under the heading 'dissaving' problems, respondents were asked whether (in the last 12 months) they had reduced home loan repayments; drawn on accumulated savings/deposits; increased the balance owing on credit cards by $1,000 or more; entered into a loan agreement with family/friends; taken out a personal loan; sold household goods or jewellery; sold shares, stocks or bonds and/or sold other assets. Using these measures Weatherburn (2011) found a strong relationship between financial stress and risk of violence, even after adjusting for a range of other factors known to influence violent victimisation (e.g. age, drug and alcohol use, sole parent status, personal autonomy).

Financial stress is not the only form of stress known to be associated with a higher risk of violence against women, though it has attracted the lion's share of attention. Cano and Vivian (2001) reviewed 17 studies that examined the relationship between life stressors (e.g. divorce or separation, death of a family member/close friend, serious illness, serious accident, mental illness, serious disability, inability to get a job, involuntary loss of job and gambling problems) and husband-to-wife violence. Thirteen of the studies found a strong relationship between these stressors and husband-to-wife violence. In his analysis of the GSS, Weatherburn (2011) also found a strong positive relationship between the number of personal stressors experienced by a woman in the previous 12 months and the risk of violent victimisation. There have, however, been some notable exceptions. Mason and Blankenship (1987) found no association between life stressors and husband-to-wife violence in a study of 155 cohabiting or married undergraduates. Pan, Neidig and O'Leary (1994) found no relationship between work stress and violence in a sample of 11,830 military personnel.

Some have suggested that the effects of stress on violent behaviour are nullified or attenuated when people can call on strong social supports (Weatherburn & Lind, 2001). Unfortunately, only a handful of quantitative studies have examined the effect of social support on violence against women and the results have been mixed.

In a survey of 557 women conducted as part of a domestic violence-screening program, Carlson, McNutt, Choi and Rose

(2002) found that both abused and non-abused women had similar levels of practical and emotional support outside the family. In contrast, using data from the 1994 National (US) Survey of Families and Households, Van Wyk et al. (2003) found that social support (as measured by frequency of a woman's contact with friends, family and relatives) reduced the risk of violence after controlling for race, disadvantage, financial stress, duration of relationship and marital status. Similar results were obtained in a survey of 1,212 women living in blue-collar work sites in North Carolina (Denham et al., 2007). Goodman, Dutton, Vankos and Weinfurt (2005) examined rates of re-abuse among 406 help-seeking African American women and found that social support acted as a protective factor for women who had no experience of serious violence but was not a protective factor for women with such experience. Interestingly, Agoff, Herrera and Castro (2007) found evidence that strong social ties in a context where violence is condoned contributes to violence rather than reduces it. The evidence on social support is too equivocal to draw any firm conclusions.

CURRENT STUDY

Much of the evidence gathered to date on the correlates of violence against women has come from cross-sectional surveys. Such surveys cannot tell us whether factors such as personal and financial stress are causes or consequences of violence (see, for example, Loxton et al., 2006). Though it does not resolve all these challenges, because they contain information about the timing of events, longitudinal surveys are of great assistance in separating out possible causes from possible effects. In this study we re-examine the relationship between personal stress, financial stress, social support and women's experiences of physical violence using the Australian Household Income and Labour Dynamics in Australia (HILDA) survey. Our aim is to determine whether higher levels of stress and/or lower levels of support at one point in time are associated with a higher risk of experiencing physical violence at a later point in time. HILDA is a nationally representative longitudinal Australian panel study that commenced in 2001. It provides data on many aspects of the lives of Australian residents, including financial stress, personal stress, social support and experiences of physical violence. As with the GSS, the HILDA survey does not ask any questions about the nature of the victim-offender relationship, in cases where the victim reports having been assaulted. It should be noted, however, that the vast majority (78%) of women who experience violence in Australia are assaulted by someone they know (Australian Bureau of Statistics, 2006).

Three sets of analyses are reported:

1. The first set examines the cross-sectional relationship between financial stress, personal stress and social support and risk of physical victimisation for women in wave *t* (where *t* is the year of the survey and data are pooled across the years 2002 to 2009). We designate this set the *Cross-Sectional Model*. Its purpose is to confirm the findings obtained by Weatherburn (2011) using somewhat different measures.
2. The second set examines the question of whether high levels of financial and personal stress, and low levels of social support in wave *t* are associated with higher risks of experiencing violence in wave *t+1* (data are pooled across the years 2002 to 2009 and *t+1* ranges from 2003 to 2010). We designate this set the *Longitudinal Model A*.
3. The third set is restricted to women who reported a change in whether they experienced physical violence or not between any pair of (not necessarily consecutive) survey waves. For example, a woman who reported being a victim of physical violence in the past 12 months at 2004 but not at 2002 or 2006 (note that all records from women who reported a change in violence status are analysed). This set of analyses examines the question of whether there is any correlation between the *change* in whether they experienced physical violence or not between any pair of survey waves and the *change* in financial stress, personal stress or social support between the same pair of survey waves. We designate this set of analyses the *Longitudinal Model B*. Observed factors and unobserved factors (such as childhood experiences of violence) that are constant over time are controlled for in *Longitudinal Model B*.

Our principal hypotheses are:

1. Higher levels of financial and personal stress and lower levels of social support in survey wave *t* will each be associated with a higher risk of experiencing physical violence in wave *t (Cross-Sectional Model)*.
2. Higher levels of financial and personal stress and lower levels of social support in survey wave *t* will be associated with a higher risk of experiencing physical violence in wave *t + 1 (Longitudinal Model A)*.
3. An increase in financial stress or personal stress or a decrease in social support between any pair of survey waves *i* and *j*, will be associated with an increase in the risk of experiencing physical violence between survey waves *i* and *j (Longitudinal Model B)*.

METHOD

DATA SOURCE

Data were sourced from Waves 2 to 10 (2002 to 2010) of the HILDA survey. The HILDA study is a broad social and economic longitudinal survey that commenced in 2001 and is ongoing (Summerfield et al., 2011). In 2001, the HILDA study was initiated with a large national probability sample of Australian households occupying private dwellings. The sampling unit is households and households were clustered within areas, and areas were stratified by state and part of state. Sample weights are available to make adjustment for attrition and benchmarking back to the initial wave characteristics.

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., 2011). 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 are out of scope (that is, those that have died or moved overseas) ranged from 13.2 percent for Wave 2 (2002) to 3.7 percent for Wave 10 (2010) (for further details of the HILDA study see Summerfield et al., 2011).

The HILDA study has a number of instruments including the:

- Household form, which records basic information about household composition immediately after making contact;
- Household questionnaire, which records information about the household rather than individuals and usually involves a face-to-face interview with one household member;
- Person questionnaire, which records information about the individual and is a face-to-face interview of every household member over 15 years of age (there are two versions of this, one for continuing household members and one for new household members); and
- 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 current study primarily focused on data from Waves 2 to 9 and data were pooled across these waves. The only data utilised from Wave 10 was the outcome variable, that is, whether the respondent was a victim of physical violence.

STUDY SAMPLE

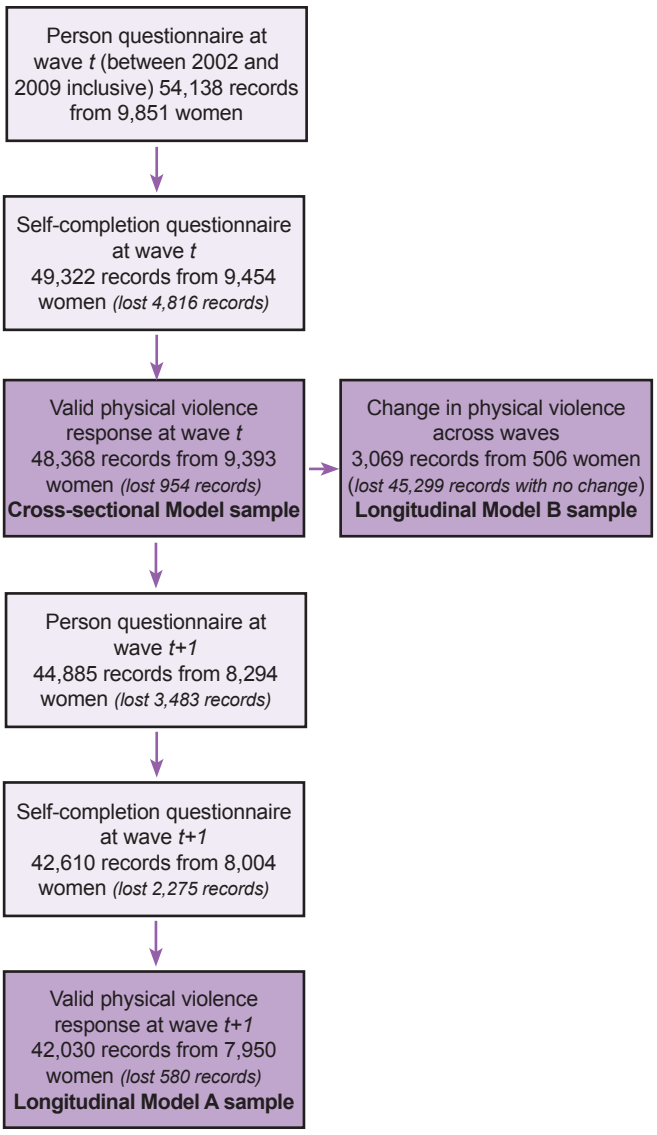
In order to be included in the study respondents had to (see Figure 1 and Appendix Table 1):

- Be female;
- Be aged 15 or more years of age on the 30th of June in the year of the survey for wave *t* (where *t* is the year of the survey and ranges from 2002 to 2009);
- Have responded to the person questionnaire in wave *t* (because the self-completion questionnaire was only given to those who responded to the person questionnaire);
- Have responded to the self-completion questionnaire in wave *t* (because the majority of variables of interest in the current study were sourced from the self-completion questionnaire);
- Have given a valid response to the item in the self-completion questionnaire on whether a victim of physical violence in the past 12 months for wave *t*;
  - » Report a change in whether a victim of physical violence or not between any pair of (not necessarily consecutive) survey waves *i* and *j* (for *Longitudinal Model B* only);
- Have responded to the person questionnaire in wave *t+1* (*t+1* ranges from 2003 to 2010; applies to *Longitudinal Model A* only);
- Have responded to the self-completion questionnaire in wave *t+1* (applies to *Longitudinal Model A* only); and
- Have given a valid response to the item in the self-completion questionnaire on whether a victim of physical violence in the past 12 months for wave *t+1* (applies to *Longitudinal Model A* only).

MEASURES

All measures were sourced from responses to the HILDA self-completion questionnaires, except for sex, age and marital status which were derived from responses to the HILDA face-to-face person interviews. These face-to-face person interviews mainly took place between August and December of each calendar year.

Figure 1. Sample selection criteria for respondents to the person questionnaire at wave t (pooled across waves from 2002 to 2009 inclusive), women only



Note. All records per woman were considered and there was between one and eight records per woman.

Physical violence outcome variables

Persons who responded to the self-completion questionnaire were asked if certain life events had happened to them in the past year. One of these life events was whether they were a 'victim of physical violence (e.g., assault)'. The two outcome variables based on responses to the physical violence life event item were:

- Victim of physical violence at wave *t* ('yes' or 'no')
- Victim of physical violence at wave *t+1* ('yes' or 'no')

Primary explanatory variables

Our primary explanatory variables are financial stress, personal stress and social support. The time period referred to in the questions relating to each primary explanatory variable, the other control variables and the violence outcome variables are presented in Table 1. Their measurement is described below.

Number of financial stressors–from a list of seven reported to have occurred since January in the survey year *t*. The number of financial stressors was categorised either '0', '1', '2', or '3 or more'. A non-missing value was obtained if a valid response was made to at least one of the seven items.[1] The financial stressors were:

- Could not pay electricity, gas or telephone bills on time
- Could not pay the mortgage or rent on time
- Pawned or sold something
- Went without meals
- Was unable to heat home
- Asked for financial help from friends or family
- Asked for help from welfare/community organisations

Number of personal stressors – based on a count of nine life events asked if they had occurred in the past year (excluding physical violence). The number of personal stressors was categorised '0', '1', '2', '3', or '4 or more'. A non-missing value was obtained if a valid response was made to at least one of the nine items.[2] The nine personal stressors were:

- Serious personal injury or illness of a close relative/family member
- Death of spouse or child
- Death of other close relative/family member (e.g., parent or sibling)
- Death of a close friend
- Retired from the workforce
- Fired or made redundant by an employer
- Changed jobs (i.e., employers)
- Major worsening in financial situation (e.g., went bankrupt)
- Changed residence

Social network mean score– based on HILDA's social network index (Wilkins & Warrens, 2012). The social network mean score was calculated as the mean item response to questions about how much support respondents get from other people.

Table 1. Time periods referred to in items

	Wave	Time periods referred to in items
Outcome variables		
Physical violence at wave *t*	*t*	In the 12 months prior to the survey
Physical violence at wave *t+1*	*t+1*	In the 12 months prior to the survey
Explanatory variables		
Number of financial stressors	*t*	Since January in year of the survey
Number of personal stressors	*t*	In the 12 months prior to the survey
Social network mean score	*t*	At the time of the survey
Alcohol consumption category	*t*	At the time of the survey
Marital status	*t*	At the time of the interview
Age on June 30 in survey year	*t*	On June 30 in year of the survey
Pregnancy	*t*	In the 12 months prior to the survey

There were five positively phrased items such as 'There is someone who can always cheer me up when I am down' and five negatively phrased items such as 'I often need help from other people but can't get it'. As no time frame was specified, we assume that responses reflect how respondents felt at the time of the survey. Response options were on a scale from 1 (strongly agree) to 7 (strongly disagree). Positive items were reverse coded. Higher mean scores indicated poorer social networks. Mean item scores were categorised either '1.00-1.99', '2.00-2.99', '3.00-3.99' or '4.00 or higher'. A mean score of '4.00 or higher' was deemed to indicate an inadequate social network (Wilkins & Warrens, 2012). A non-missing mean score was obtained if at least eight of the ten items had a valid response.[3]

Controls

In analysing the influence of financial stress, personal stress and social support on violence against women the question naturally arises as to what controls to include in the analysis. Past research (Coumarelos & Allen, 1998; Weatherburn, 2011; Johnson et al., 2010; Taft, Watson & Lee, 2004) has shown that women are more at risk of violence if they are young, sole parents, victims of abuse as a child, in a relationship with a partner who is controlling or have an alcohol problem. It has sometimes been suggested that pregnancy is a risk factor, though most of the research suggesting this has come from clinic or other non-representative samples. Representative sample surveys of women generally find no association between pregnancy and risk of violence (Jasinski, 2004).

Nevertheless, since HILDA contains a question asking whether the respondent was pregnant we included pregnancy as a control in the current analysis.

HILDA has variables that can be used to control for age, marital status and whether pregnant in the previous year. It does not have questions that could be used to measure experience of violence or abuse as a child or whether their partner is domineering or controlling. It does not ask respondents whether they are in a relationship where alcohol is a problem, however it does ask respondents 'Do you drink alcohol?' and 'On a day that you have an alcoholic drink, how many standard drinks do you usually have?' Responses to these items on the frequency and intensity of alcohol consumption were converted into a number of drinking occasions per week and into a number of alcoholic drinks per occasion, respectively.[4] Number of drinking occasions per week and number of alcoholic drinks per occasion were multiplied to obtain a number of alcoholic drinks per week. The number of alcoholic drinks per week was classified into drinking categories based on the 2001 National Health and Medical Research Council Australian alcohol guidelines (see Laslett et al, 2010). The categories were 'low risk – less than 12 drinks per week', 'risky to high risk – 12 or more drinks per week' and 'abstainer or ex-drinker'. The controls included, therefore were:

- Marital status at the time of interview ('married', 'de facto', 'separated', 'divorced', 'widowed', or 'never married and not de facto')
- Age in years on June 30 in the year of the interview ('15-24', '25-54', '55-64' or '65+')
- Whether experienced pregnancy or pregnancy of partner in the past year (based on a life event item) ('yes' or 'no')
- Alcohol consumption ('low risk', 'risky to high risk', 'abstainer')

STATISTICAL ANALYSES

All statistical analyses were conducted in STATA/MP 12.0.[5]

Generalised estimating equations models

There were multiple records per woman available for analysis and every record with data on the outcome and explanatory variables was modelled. The number of records per woman ranged from 1 to 8. To account for the repeated nature of the data, the *Cross-Sectional Model* and *Longitudinal Model A* were specified as logistic generalized estimating equations (GEE) models with an unstructured covariance matrix and semi-robust standard errors.[6]

The *Cross-Sectional Model* examines the relationship between the explanatory variables and the outcome of violence against women at wave *t*, where *t*, the year of the survey, ranged from 2002 to 2009. All available waves of data were used, for example, if a woman participated in the self-completion questionnaire from 2002 to 2009, eight records for that woman were analysed using GEEs to account for the repeated nature of the data. *Longitudinal Model A* examines the relationship between the explanatory variables at wave *t* and the outcome of physical victimisation at wave *t+1*.

Fixed effects model

Standard regression models, such as the GEE models just considered, can only control for factors that are observed and measured. In our case these controls comprised marital status, age, pregnancy status and alcohol use. Fixed effects models examine changes in the outcome variable *within* rather than between individuals (Allison, 2009). This allows them to control for all time-constant factors, regardless of whether or not they are measured and included in the analysis. *Longitudinal Model B* [7] is a fixed effect model that focuses on the question of whether individuals who experienced an increase (or decrease) in financial stress, personal stress or social support also experienced an increase (or decrease) in their risk of violence victimisation. The data on which *Longitudinal Model B* is based only includes records from women who experienced a change in their victimisation status between any pair of (not necessarily consecutive) survey waves *i* and *j*. A change in violence status across waves was recorded by only 5.4 percent (n=506) of the 9,393 women considered in the Cross-Sectional sample. The analysis for *Longitudinal Model B* is based on the 3,069 records collected from these women.

RESULTS

CROSS-SECTIONAL MODEL

Sample description

Table 2 shows the frequency distribution of respondents in each survey wave and responses to variables included in the *Cross-Sectional Model* (n=48,368 records pooled across 2002 to 2009). Records were fairly evenly distributed across the survey waves. The majority (75%) had no financial stressors but some personal stressors (53% had one or more). Only nine percent had inadequate social networks, while ten percent were risky to high risk consumers of alcohol.

Bi-variate correlates of physical violence for women

Table 2 also shows the bi-variate relationship between each explanatory variable in the *Cross-Sectional Model* and whether or not the respondent was a victim of physical violence (n=48,368 records). Having been a victim of physical violence in the past year was reported at wave *t* in 1.7 percent of records. All chi-square tests of association between wave *t* explanatory variables and reporting being victim of physical violence in past year at wave *t* were significant at the 0.05 level (except for the survey year). The proportion of women reporting experiencing physical violence at wave *t* was higher where there was financial and personal stress, a poor social network, risky consumption of alcohol, separation, younger age or pregnancy.

The bi-variate relationship between individual financial stressors and personal stressors at wave *t* and physical victimisation at wave *t* are shown in Appendix Tables 2 and 3, respectively (n=48,368 records). Each financial and personal stressor was

Table 2. Explanatory variable frequencies and bi-variate relationships with physical violence victimisation in past year reported at wave t, women only (Cross-Sectional Model) (n=48,368 records from 9,393 women)

	Total records		Wave *t* victims of physical violence	
Wave *t* explanatory variables	N total	Percent of total	N victims	Percent victims
Total	**48,368**	**100.0**	**838**	**1.7**
Wave t (year of survey)				
2002	6,264	13.0	125	2.0
2003	6,111	12.6	120	2.0
2004	5,952	12.3	99	1.7
2005	6,008	12.4	100	1.7
2006	6,126	12.7	109	1.8
2007	5,977	12.4	90	1.5
2008	5,876	12.2	96	1.6
2009	6,054	12.5	99	1.6
Number of financial stressors				
0	36,318	75.1	304	0.8
1	5,034	10.4	124	2.5
2	3,063	6.3	101	3.3
3+	3,207	6.6	300	9.4
Missing	746	1.5	9	1.2
Number of personal stressors				
0	22,902	47.4	185	0.8
1	15,658	32.4	261	1.7
2	7,043	14.6	212	3.0
3	2,128	4.4	109	5.1
4+	637	1.3	71	11.2
Social network mean score				
1.00-1.99	17,006	35.2	159	0.9
2.00-2.99	16,671	34.5	220	1.3
3.00-3.99	9,857	20.4	230	2.3
4.00-7.00 (inadequate)	4,542	9.4	222	4.9
Missing	292	0.6	7	2.4
Number of alcoholic drinks per week				
Low risk (<12)	33,303	68.9	533	1.6
Risky to high risk (12+)	4,718	9.8	136	2.9
Abstainer (0)	9,489	19.6	158	1.7
Missing	858	1.8	11	1.3
Marital status				
Legally married	23,743	49.1	153	0.6
De facto	5,797	12.0	131	2.3
Separated	1,468	3.0	86	5.9
Divorced	3,530	7.3	70	2.0
Widowed	3,633	7.5	15	0.4
Never married, not de facto	10,190	21.1	381	3.7
Missing	7	0.0	2	28.6
Age on June 30 in survey year				
15-24	8,332	17.2	294	3.5
25-54	26,138	54.0	477	1.8
55-64	6,403	13.2	39	0.6
65+	7,495	15.5	28	0.4
Pregnancy in past year				
No	45,649	94.4	771	1.7
Yes	2,628	5.4	60	2.3
Missing	91	0.2	7	7.7

Note. All available waves of data between 2002 and 2009 for each woman were included. All chi-square tests of association between physical violence at wave t and explanatory variables at wave t (except for the survey year) were significant at the 0.05 level.

significantly associated with higher physical victimisation at the same wave. For example, wave *t* physical victimisation was reported by 11.6 percent of women who went without meals but only 1.4 percent of women who did not go without meals at wave *t*.

Adjusted cross-sectional correlates of physical violence for women

The results of the logistic GEE model of wave *t* physical victimisation are shown in Table 3 (n=46,468 records).[8] This model examines the cross-sectional relationship between financial stress, personal stress and social networks and the outcome of being a victim of physical violence after adjusting for alcohol consumption, marital status, age and pregnancy. Odds ratios greater than one in Table 3 indicate a positive relationship between the variable and the outcome at the same wave (higher odds of physical violent victimisation). Odds ratios of less than one indicate a negative relationship (lower odds of physical violent victimisation). An odds ratio whose confidence interval overlaps with zero indicates no significant relationship. Examination of the odds ratios shows that:

- Women with financial stressors at wave *t* had higher odds of physical victimisation in the same wave (wave *t*) than those with no financial stressors. For example, women with three or more financial stressors had 4.1 times the odds of physical victimisation than those with none.
- Women with personal stressors at wave *t* had higher odds of physical victimisation at the same wave than those with no personal stressors. For example, women with four or more personal stressors had 4.9 times the odds of physical victimisation than those with none.
- Women with poorer social networks at wave *t* had higher odds of physical victimisation at the same wave than those with strong social networks. For example, women with a social network

Table 3. Predictors of physical violence victimisation reported at wave t, women only (Cross-Sectional Model) (n=46,468 records from 9,310 women)

Wave t explanatory variables	Adjusted odds ratio (wave *t* violence versus no)	95% confidence interval	*p*-value
Number of financial stressors			
0[a]	1.00		
1	1.67	(1.32, 2.10)	<.001
2	1.98	(1.53, 2.55)	<.001
3+	4.07	(3.28, 5.05)	<.001
Number of personal stressors			
0[a]	1.00		
1	1.57	(1.30, 1.89)	<.001
2	2.16	(1.73, 2.69)	<.001
3	2.91	(2.24, 3.78)	<.001
4+	4.90	(3.47, 6.91)	<.001
Social network mean score			
1.00-1.99[a]	1.00		
2.00-2.99	1.27	(1.03, 1.58)	.027
3.00-3.99	1.93	(1.55, 2.42)	<.001
4.00-7.00 (inadequate)	2.77	(2.15, 3.57)	<.001
Number of alcoholic drinks per week			
Low risk (<12)[a]	1.00		
Risky to high risk (12+)	1.46	(1.17, 1.84)	.001
Abstainer (0)	1.12	(0.91, 1.38)	.273
Marital status			
Legally married[a]	1.00		
De facto	1.76	(1.31, 2.35)	<.001
Separated	4.48	(3.15, 6.36)	<.001
Divorced	1.82	(1.26, 2.64)	.002
Widowed	0.78	(0.39, 1.57)	.492
Never married, not de facto	3.36	(2.56, 4.41)	<.001
Age on June 30 in survey year			
15-24[a]	1.00		
25-54	0.85	(0.68, 1.05)	.129
55-64	0.40	(0.25, 0.65)	<.001
65+	0.45	(0.26, 0.75)	.003
Pregnancy in past year			
No[a]	1.00		
Yes	0.96	(0.68, 1.35)	.800

Note. All waves of data with no missing information between 2002 and 2009 for each woman were included. 1,900 of the 48,368 records were not included in the model as they had missing data for an explanatory variable. The adjusted model included only variables included in this table. Survey year was not included in the model as it was not significant at the 0.05 level.

[a] Reference category.

score between 4.00 and 7.00 (inadequate networks) had 2.8 times the odds of physical victimisation than those with a social network score between 1.00 and 1.99 (good networks).

- Risky to high risk consumers of alcohol at wave *t* had 1.5 times the odds of physical victimisation at the same wave than low risk consumers of alcohol. Abstainers of alcohol had similar odds of physical victimisation to low risk consumers of alcohol.
- Women who reported being in a de facto relationship, separated, divorced, or who had never been married (and were not in a de facto relationship) at wave *t* had higher odds of physical victimisation at the same wave than those who were married. For example, women who were separated had 4.5 times the odds of physical victimisation than those who were married.
- Women aged 55 years or older at wave *t* had lower odds of physical victimisation at the same wave than those aged 15 to 24 years old. For example, women aged between 55 and 64 years old had 0.4 times the odds of physical victimisation than those aged 15 to 24 years old. Women aged 25 to 54 years had similar odds of violence to those aged 15 to 24 years.
- Women who reported pregnancy in the past year at wave *t* had similar odds of physical victimisation at the same wave than those not pregnant in the past year.

LONGITUDINAL MODEL A

Sample description

We turn now to the longitudinal relationships between the explanatory variables and physical victimisation. Table 4 shows the frequency distribution of survey wave and responses to the explanatory variables included in the *Longitudinal Model A* (n=42,030 records). As this sample is a sub-sample of that used in the *Cross-Sectional Model* (6,338 records were excluded as they were missing information on whether a victim of physical violence in the past year at wave *t+1*), it is not surprising to find that this sample resembles that examined in the cross-sectional analysis. The majority had no financial stressors, some personal stressors, adequate social networks and were not risky to high risk consumers of alcohol.

Table 4. Explanatory variable frequencies and bi-variate relationships with physical violence victimisation in past year reported at wave t + 1, women only (Longitudinal Model A) (n=42,030 records from 7,950 women)

	Total records		Wave *t+1* victims of physical violence	
Wave *t* explanatory variables	**N total**	**Percent of total**	**N victims**	**Percent victims**
Total	**42,030**	**100.0**	**577**	**1.4**
Wave *t* (year of survey)				
2002	5,331	12.7	81	1.5
2003	5,237	12.5	72	1.4
2004	5,189	12.4	65	1.3
2005	5,276	12.6	85	1.6
2006	5,288	12.6	69	1.3
2007	5,136	12.2	68	1.3
2008	5,142	12.2	67	1.3
2009	5,431	12.9	70	1.3
Number of financial stressors				
0	32,072	76.3	249	0.8
1	4,232	10.1	83	2.0
2	2,536	6.0	63	2.5
3+	2,566	6.1	174	6.8
Missing	624	1.5	8	1.3
Number of personal stressors				
0	20,160	48.0	164	0.8
1	13,627	32.4	194	1.4
2	5,979	14.2	127	2.1
3	1,766	4.2	58	3.3
4+	498	1.2	34	6.8
Social network mean score				
1.00-1.99	14,956	35.6	115	0.8
2.00-2.99	14,584	34.7	178	1.2
3.00-3.99	8,474	20.2	140	1.7
4.00-7.00 (inadequate)	3,789	9.0	143	3.8
Missing	227	0.5	1	0.4
Number of alcoholic drinks per week				
Low risk (<12)	29,116	69.3	365	1.3
Risky to high risk (12+)	4,086	9.7	82	2.0
Abstainer (0)	8,123	19.3	122	1.5
Missing	705	1.7	8	1.1
Marital status				
Legally married	21,389	50.9	143	0.7
De facto	4,842	11.5	102	2.1
Separated	1,261	3.0	42	3.3
Divorced	3,134	7.5	57	1.8
Widowed	3,041	7.2	11	0.4
Never married, not de facto	8,357	19.9	220	2.6
Missing	6	0.0	2	33.3
Age on June 30 in survey year				
15-24	6,706	16.0	184	2.7
25-54	22,974	54.7	338	1.5
55-64	5,848	13.9	34	0.6
65+	6,502	15.5	21	0.3
Pregnancy in past year				
No	39,701	94.5	531	1.3
Yes	2,267	5.4	44	1.9
Missing	62	0.2	2	3.2

Note. All available waves of data between 2002 and 2009 for each woman were included (with violence at *t+1*=2010 when *t*=2009). All chi-square tests of association between wave *t+1* violence and wave *t* explanatory variables (except for the survey year) were significant at the 0.05 level.

Bi-variate correlates of physical violence for women

Table 4 also shows the bi-variate relationship between explanatory variables wave *t* and whether or not the respondent reported being victim of physical violence in the past 12 months at wave *t+1* (n=42,030 records). Having been a victim of physical violence in the past year was reported at wave *t+1* for 1.4 percent of records. All chi-square tests of association between wave *t* explanatory variables and wave *t+1* reports of being a victim of physical violence in past year were significant at the 0.05 level (except for survey year). The percentage of wave *t+1* physical violence victimisation was higher if there were financial or personal stressors, poor social networks, risky to high risk consumption of alcohol, separation, younger age or pregnancy at wave *t*.

The bi-variate relationships between individual financial stressors and personal stressors at wave *t* and physical violence victimisation at wave *t+1* are shown in Appendix Tables 2 and 3, respectively (n=42,030 records). Each financial and personal stressor at wave *t* was significantly associated with a higher risk of physical violence victimisation at wave *t+1*, except for death of a spouse/child and retired from the workforce. For example, physical violence victimisation at wave *t+1* was reported by 8.6 percent of women who asked for help from welfare/community organisations but only 1.1 percent of women who did not ask for help from welfare/community organisations at wave *t*.

Adjusted longitudinal predictors of physical violence for women

The results of the logistic GEE model for the *Longitudinal Model A* analysis are shown in Table 5 (n=40,460 records).[9] Examination of the odds ratios indicates that:

- Women with financial stressors at wave *t* had higher odds of physical violence victimisation at wave *t+1* than those with no financial stressors. For example, women with three or more financial stressors had 3.5 times the odds of subsequent physical violence than those with none.
- Women with personal stressors at wave *t* had higher odds of physical violence victimisation at wave *t+1* than those with no personal stressors. For example, women with four or more personal stressors had 2.9 times the odds of subsequent physical violence than those with none.

Table 5. Predictors of physical violence victimisation reported at wave t+1, women only (Longitudinal Model A) (n=40,460 records from 7,908 women)

Wave *t* explanatory variables	Adjusted odds ratio (wave *t+1* violence versus no)	95% confidence interval	*p*-value
Number of financial stressors			
0 [a]	1.00		
1	1.51	(1.13, 2.01)	.005
2	1.72	(1.25, 2.37)	.001
3+	3.48	(2.66, 4.55)	<.001
Number of personal stressors			
0 [a]	1.00		
1	1.33	(1.08, 1.65)	.008
2	1.46	(1.13, 1.87)	.003
3	1.75	(1.26, 2.45)	.001
4+	2.91	(1.82, 4.63)	<.001
Social network mean score			
1.00-1.99 [a]	1.00		
2.00-2.99	1.49	(1.18, 1.89)	.001
3.00-3.99	1.57	(1.20, 2.06)	.001
4.00-7.00 (inadequate)	2.69	(2.00, 3.62)	<.001
Number of alcoholic drinks per week			
Low risk (<12) [a]	1.00		
Risky to high risk (12+)	1.38	(1.03, 1.85)	.033
Abstainer (0)	1.29	(1.02, 1.64)	.036
Marital status			
Legally married [a]	1.00		
De facto	1.72	(1.22, 2.43)	.002
Separated	2.05	(1.21, 3.48)	.007
Divorced	1.68	(1.10, 2.56)	.017
Widowed	0.97	(0.44, 2.15)	.942
Never married, not de facto	2.14	(1.53, 3.00)	<.001
Age on June 30 in survey year			
15-24 [a]	1.00		
25-54	0.77	(0.58, 1.03)	.083
55-64	0.39	(0.23, 0.65)	<.001
65+	0.23	(0.12, 0.46)	<.001
Pregnancy in past year			
No [a]	1.00		
Yes	1.10	(0.76, 1.58)	.616

Note. All waves of data with no missing information between 2002 and 2009 for each woman were included (with violence at *t+1*=2010 when *t*=2009). 1,570 of the 42,030 records were not included in the model as they had missing data for an explanatory variable. The adjusted model included only variables included in this table. Survey year was not included in the model as it was not significant at the 0.05 level.

[a] Reference category.

- Women with poorer social networks at wave *t* had higher odds of physical violence victimisation at wave *t+1* than those with good social networks. For example, women with a social network score between 4.00 and 7.00 (inadequate networks) had 2.7 times the odds of subsequent physical violence than those with a social network score between 1.00 and 1.99 (good networks).
- Risky to high risk consumers of alcohol at wave *t* had 1.4 times the odds of physical violence victimisation at wave *t+1* than low risk consumers of alcohol. Abstainers from alcohol had 1.3 times the odds of subsequent physical violence than low risk consumers of alcohol.
- Women who reported being in a de facto relationship, separated, divorced or who had never been married (and were not in a de facto relationship) at wave *t* had higher odds of physical violence victimisation at wave *t+1* than those married. For example, women who were separated had 2.1 times the odds of subsequent physical violence than those who were married.
- Women aged 55 years or older at wave *t* had lower odds of physical violence victimisation at wave *t+1* than those aged 15 to 24 years. For example, women aged between 55 and 64 years had 0.4 times the odds of subsequent physical violence than those aged 15 to 24 years. Women aged 25 to 54 years had similar odds of subsequent violence to those aged 15 to 24 years.
- Women who reported pregnancy in the past year at wave *t* had similar odds of physical victimisation at wave *t+1* than those not pregnant in the past year.

LONGITUDINAL MODEL B

Sample description

In total, there were 9,393 women (from whom we have 48,368 survey records) who were aged 15 years or older and responded to the physical violence victimisation item in at least one wave of the HILDA survey. As noted earlier, in this section, we are only concerned with women whose response to the physical violence question changed at some point during successive HILDA waves (i.e. either they switched from saying they had not experienced violence in the previous 12 months to saying they had, or vice versa). This dramatically reduces the sample available for analysis.

No physical violence victimisation in the past year was reported across all waves with valid violence data for 8,797 women or 93.7 percent of women (these women had valid data for between one and eight waves; 33.7% of the 8,797 women had eight waves of data). Physical violence victimisation in the past year was reported across all waves with valid violence data for 90 women or 1.0 percent of women (these women had valid data for between one and five waves; 81.1% of the 90 women had only one wave of valid data). A change across any two, not necessarily consecutive, waves in response to the physical violence question occurred for just 506 women (5.4% of the 9,393 women with a valid response to the physical violence question).

Table 6 shows the number of waves with valid data by the number of waves a victim of physical violence in the past 12 months. The most common number of waves with valid data was eight (n=179 women, 35.4%). The majority of women who provided eight valid waves of survey data experienced victimisation for only one of their eight waves (n=117 women, 23.1%). A diminishing number reported victimisation for two (n=40, 7.9%), three (n=16, 3.2%) or four (n=2, 0.4%) out of eight waves. The pattern is similar across respondents who completed less than eight waves of survey data. Overall, 361 respondents (71.3%) experienced victimisation at one of their two or more waves. Nineteen percent experienced victimisation twice out of their three or more waves but the percentages experiencing victimisation more than twice were quite small.

There were a total of 3,069 records collected from the 506 women who reported a change in violence status across waves. Table 7, at the records level, shows the frequency distribution of respondents in each survey wave and responses

Table 6. Number of waves reporting physical violence victimisation by number of waves with valid data, women with a change in violence status only (Longitudinal Model B) (n=506 women)

Number of waves reported being a victim of violence	Total	Number of waves with valid data						
		8 waves	7 waves	6 waves	5 waves	4 waves	3 waves	2 waves
		n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Total	**506 (100.0)**	**179 (35.4)**	**99 (19.6)**	**53 (10.5)**	**49 (9.7)**	**45 (8.9)**	**39 (7.7)**	**42 (8.3)**
1 wave	361 (71.3)	117 (23.1)	62 (12.3)	34 (6.7)	39 (7.7)	37 (7.3)	30 (5.9)	42 (8.3)
2 waves	96 (19.0)	40 (7.9)	23 (4.6)	13 (2.6)	5 (1.0)	6 (1.2)	9 (1.8)	-
3 waves	35 (6.9)	16 (3.2)	9 (1.8)	4 (0.8)	4 (0.8)	2 (0.4)	-	-
4 waves	5 (1.0)	2 (0.4)	2 (0.4)	0 (0.0)	1 (0.2)	-	-	-
5 waves	7 (1.4)	2 (0.4)	3 (0.6)	2 (0.4)	-	-	-	-
6 waves	2 (0.4)	2 (0.4)	0 (0.0)	-	-	-	-	-

Note. % refers to percentage of the 506 women who reported a change in violence status over time.

Table 7. Explanatory variable frequencies (Longitudinal Model B) (n=3,069 records from 506 women)

Wave *t* explanatory variables	Number of records	Percent of total records
Wave *t* (year of survey)		
2002	353	11.5
2003	376	12.3
2004	386	12.6
2005	395	12.9
2006	410	13.4
2007	382	12.5
2008	385	12.5
2009	382	12.5
Number of financial stressors		
0	1467	47.8
1	456	14.9
2	379	12.4
3+	730	23.8
Missing	37	1.2
Number of personal stressors		
0	1015	33.1
1	1006	32.8
2	662	21.6
3	255	8.3
4+	131	4.3
Social network mean score		
1.00-1.99	681	22.2
2.00-2.99	946	30.8
3.00-3.99	770	25.1
4.00-7.00 (inadequate)	652	21.2
Missing	20	0.7
Number of alcoholic drinks per week		
Low risk (<12)	2024	66.0
Risky to high risk (12+)	407	13.3
Abstainer (0)	593	19.3
Missing	45	1.5
Partnered		
Yes	1346	43.9
No	1720	56.0
Missing	3	0.1
Age on June 30 in survey year		
15-24	831	27.1
25-54	1880	61.3
55-64	207	6.7
65+	151	4.9

Note. All available waves of data between 2002 and 2009 for each woman were included.

to variables included in the fixed effects model (i.e. *Longitudinal Model B*). Age was not included as a time-varying factor as age changes over time in the same way for all women. There was not substantial change over time between all categories of marital status. Thus, marital status was aggregated to partnered (married or de facto) or not partnered (separated, divorced, widowed and never married/not presently in a de facto relationship). Pregnancy, by its very nature, is a change variable and it was not included in the fixed effects model.

As expected, since all persons in this sub-sample reported physical violence victimisation at some point, personal problems of one sort or another were more common in the sample of women who experienced a change violence victimisation than in the earlier cross-sectional and longitudinal samples (see Tables 1 and 4). For example,

- 52 percent (compared to 25% in Table 2) had financial stressors,
- 67 percent (compared to 53% in Table 2) had personal stressors,
- 21 percent (compared to 9% in Table 2) had inadequate social networks,
- 13 percent (compared to 10% in Table 2) were risky to high risk consumers of alcohol, and
- 56 percent (compared to 39% in Table 2) were not partnered.

Explanatory variable frequencies at waves *t* and *t+1* for women who changed between no violence and violence across subsequent waves

Before presenting the results of the fixed effects analysis it is useful to inquire into whether changes in explanatory variables (e.g. an increase in the percentage of respondents who had no financial stressors) have the expected effects on violence (i.e. a decrease in the percentage of respondents reporting no experience of violence). In Table 8 the first panel shows the relevant pattern for women who changed from no violence at wave *t* to violence at wave *t+1* (where *t* ranges from 2002 to 2008). The second panel shows the pattern for women who experienced violence at wave *t* but no violence at wave *t+1* (where *t* once again ranges from 2002 to 2008). Since women in the first panel shifted from no violence in wave *t* to violence at *t+1*, we would expect the proportion reporting financial stress to increase from *t* to *t+1*. This appears to be the case, the percentage reporting 'no financial stressors' falls from 46.7 percent to 43.9 percent. The percentage reporting three or more financial stressors rises from 24.0 percent to 28.8 percent. As expected, the pattern reverses itself when we examine respondents who shifted from violence at wave *t* to no violence at *t+1*. Here the percentage reporting 'no financial stress' rises from 41.9 percent to 46.2 percent, while the percentage reporting three or more financial stresses falls from 28.7 percent to 24.2 percent. Similar effects can be observed for the personal stress and whether or not the respondent was partnered. Much smaller changes can be observed for social network score and number of alcoholic drinks per week.

Table 8. Explanatory variables at wave t and wave t+1 for women who changed from no violence at wave t to violence at wave t+1 (n=358 records from 331 women), or who changed from violence at wave t to no violence at wave t+1 (n=422 records from 384 women) (subset of records in Longitudinal Model B)

	No violence [wave *t*] to violence [wave *t+1*]				Violence [wave *t*] to no violence [wave *t+1*]			
	Wave *t* (n=358 records)		Wave *t+1* (n=358 records)		Wave *t* (n=422 records)		Wave *t+1* (n=422 records)	
	N	Percent	N	Percent	N	Percent	N	Percent
Number of financial stressors								
0	167	46.7	157	43.9	177	41.9	195	46.2
1	56	15.6	58	16.2	65	15.4	68	16.1
2	45	12.6	35	9.8	54	12.8	53	12.6
3+	86	24.0	103	28.8	121	28.7	102	24.2
Missing	4	1.1	5	1.4	5	1.2	4	1.0
Number of personal stressors								
0	116	32.4	91	25.4	99	23.5	123	29.2
1	127	35.5	116	32.4	134	31.8	154	36.5
2	67	18.7	90	25.1	111	26.3	99	23.5
3	30	8.4	34	9.5	51	12.1	33	7.8
4+	18	5.0	27	7.5	27	6.4	13	3.1
Social network mean score								
1.00-1.99	79	22.1	76	21.2	79	18.7	91	21.6
2.00-2.99	120	33.5	104	29.1	119	28.2	122	28.9
3.00-3.99	81	22.6	91	25.4	123	29.2	107	25.4
4.00-7.00 (inadequate)	77	21.5	83	23.2	97	23.0	97	23.0
Missing	1	0.3	4	1.1	4	1.0	5	1.2
Number of alcoholic drinks per week								
Low risk (<12)	224	62.6	245	68.4	273	64.7	278	65.9
Risky to high risk (12+)	51	14.3	46	12.9	61	14.5	55	13.0
Abstainer (0)	79	22.1	59	16.5	83	19.7	80	19.0
Missing	4	1.1	8	2.2	5	1.2	9	2.1
Partnered								
No	192	53.6	225	62.9	273	64.7	252	59.7
Yes	166	46.4	131	36.6	149	35.3	170	40.3
Missing	0	0.0	2	0.6	0	0.0	0	0.0

Adjusted longitudinal predictors of physical violence for women with changed victimisation status

The adjusted effects of *Longitudinal Model B* are shown in Table 9 (n=2,887 records). It is important to remember that the variables in the table measure the association between changes in independent variables and changes in the dependent variable, not the association between values of the independent variable and values of the dependent variable. For example, if a woman changed from having no financial stressors to having three or more financial stressors, her odds of experiencing violence increased 1.7 times. After adjusting for financial stressors, personal stressors, social networks, alcohol consumption and partner status, the fixed effects model of physical violence victimisation reveals that:

- If a woman changed from having no financial stressors to having some, her odds of being a victim of physical violence increased. As already noted, if a woman changed from having no financial stressors to having three or more financial stressors, her odds of experiencing violence increased 1.7 times.

- If a woman changed from having no personal stressors to having some personal stressors, her odds of being a victim of physical violence increased. For example, if a woman went from have none to having four or more personal stressors, her odds of experiencing physical violence increased 2.7 times.
- If a woman changed from being partnered to not being partnered, her odds of being a victim of physical violence increased 2.3 times.
- Changes in social network score and changes in alcohol consumption did not impact the odds of experiencing physical violence.

Table 9. Predictors of physical violence victimisation in past year, women with changed victimisation status (Longitudinal Model B) (n=2,887 records from 484 women)

Explanatory variables	Adjusted odds ratio (yes violence versus no)	95% confidence interval	*p*-value
Year [a]	0.93	(0.89, 0.97)	.001
Number of financial stressors			
0 [b]	1.00		
1	1.13	(0.83, 1.53)	.441
2	1.15	(0.81, 1.63)	.450
3+	1.74	(1.25, 2.44)	.001
Number of personal stressors			
0 [b]	1.00		
1	1.45	(1.13, 1.87)	.004
2	1.91	(1.44, 2.53)	<.001
3	2.36	(1.62, 3.42)	<.001
4+	2.70	(1.66, 4.37)	<.001
Social network mean score			
1.00-1.99 [b]	1.00		
2.00-2.99	1.00	(0.74, 1.36)	.984
3.00-3.99	1.34	(0.95, 1.89)	.094
4.00-7.00 (inadequate)	1.27	(0.86, 1.86)	.225
Number of alcoholic drinks per week			
Low risk (<12) [b]	1.00		
Risky to high risk (12+)	1.01	(0.69, 1.48)	.966
Abstainer (0)	0.87	(0.60, 1.24)	.430
Partner status			
Yes [b]	1.00		
No	2.31	(1.67, 3.20)	<.001

Note. 182 of the 3,069 records were not included in the model as one of the women's records of a change in violence had missing data for an explanatory variable. However, all waves of data with no missing explanatory variable information between 2002 and 2009 for each woman were included. Only variables presented in this table were included in the adjusted model.

[a] Year was entered as a continuous variable.

[b] Reference category.

DISCUSSION

Our hypotheses were that:

1. Higher levels of financial and personal stress and lower levels of social support in survey wave *t* will each be associated with a higher risk of experiencing physical violence in wave *t (Cross-Sectional Model)*.
2. Higher levels of financial and personal stress and lower levels of social support in survey wave *t* will be associated with a higher risk of experiencing physical violence in wave *t + 1 (Longitudinal Model A)*.
3. An increase (or decrease) in financial stress or personal stress or a decrease (or increase) in social support between any pair of survey waves *i* and *j*, will be associated with an increase (or decrease) in the risk of experiencing physical violence between survey waves *i* and *j (Longitudinal Model B)*.

Hypotheses (1) and (2) were confirmed. Hypothesis (3) was also confirmed so far as financial stress and personal stress are concerned. We found no evidence, however, that increases (or decreases) in social support were accompanied by increases (or decreases) in risk of violence. However, this may reflect the small sample size (n= 506) on which *Longitudinal Model B* was based. It is worth noting in this connection that the *p*-value for one of the social support contrasts in *Longitudinal Model B* (social network score 3.00-3.99 versus 1.00-1.99) came close to significance ($p = .076$).

There are several other findings worthy of comment. Firstly, our estimate of the overall past year prevalence of physical violence against women (1.7%) is lower than that reported in other Australian crime victimisation surveys. The last national Personal Safety Survey (PSS) (Australian Bureau of Statistics, 2006), for example, estimated that 4.7 percent of Australian women aged 18 and over had been physically assaulted in the previous 12 months. One likely contributing factor to the difference in estimated prevalence is that the interviews conducted as part of the PSS were face-to-face and conducted in the absence of any other person (including any other member of the family). Interviewers were also given specific training in how to interview victims of domestic violence. Neither of these conditions applied to the sections of HILDA dealing with whether or not the respondents were victims of violence as this item was part of the self-completion questionnaire. This may have made women participating in HILDA more reluctant to disclose past experience of violence.

Despite suggestions that women are more at risk of violence when pregnant (see introduction), the variable measuring whether the respondent (or their partner) had been pregnant in the previous year was not significant in the *Cross-Sectional Model* or *Longitudinal Model A* (it was not included in *Longitudinal Model B*). Although this finding contradicts evidence from some clinical studies, it is entirely consistent with studies of violence against women using large representative sample surveys (Jasinski, 2004). Our findings on alcohol are more of a surprise, given the consistency of its association with violence in past research. We found that alcohol consumption had a significant positive effect on risk of victimisation in both the *Cross-Sectional Model* and *Longitudinal Model A*. It did not, however, have a significant effect in *Longitudinal Model B*. There are two possible reasons for this. One is the small sample size on which *Longitudinal Model B* is based. The other is that an increase in the respondent's (i.e. victim's) alcohol consumption may not necessarily signal an increase in alcohol consumption by the offender.

The overall results obtained in this study are consistent with earlier research by the NSW Bureau of Crime Statistics and Research (Weatherburn, 2011) showing that higher levels of financial and personal stress, and lower levels of social support in a given year are associated with a higher risk of physical victimisation in that year. The current study, however, strengthens our confidence that this association is causal. There are two reasons for this. First, the current study shows that higher levels of financial and personal stress and lower levels of social support in a given year are associated with a higher risk of physical violence victimisation *in the following year*. Secondly, it shows that women who experience an increase over time in personal and financial stress also experience an increase in the risk of becoming victims of physical violence (and vice versa). The second finding is particularly important as it arises from an analysis which controls for all individual-specific time invariant characteristics of survey respondents, regardless of whether they were measured or unmeasured (e.g. early childhood experience of violence).

Strong as our findings are, they do not establish beyond doubt that financial and personal stress and lack of social support increase the risk of violence against women. As with all surveys, HILDA relies on accurate recall and honest reporting by respondents. The representativeness of the findings may have been affected by respondent attrition. We did not control for all factors known to be associated with violence against women. *Longitudinal Model B* controlled for all fixed factors (measured or unmeasured) but it did not control for factors such as residence with a partner who is domineering and controlling; a factor that may change over time and which has been shown in past research to be a strong risk factor for violence (Johnson et al., 2010; Mouzos & Makkai, 2004). It is hard to see how our failure to control for this factor would explain the apparent effect of personal and financial stress, and lack (or loss) of social support on physical violence victimisation[10]. At the same time, our confidence in the effects of financial stress, personal stress and social support on violence against women would have been stronger if we had been able to control for this factor.

It is clear from the current study that the key impediment to our understanding of violence against women in Australia is that we lack adequate survey vehicles for investigating the problem. Surveys like HILDA and the GSS contain a great deal of information potentially relevant to an understanding of intimate partner and family violence but neither survey asks respondents about the nature of the victim-offender relationship. Crime victim surveys which do ask questions about the victim-offender relationship (e.g. the PSS), on the other hand, often collect little information which could be used to help us understand the factors that influence intimate partner and family violence (e.g. they do not collect information on financial stress, social support, alcohol consumption or the attitudes and behaviour of partners). Future surveys on violence against women should be designed to provide detailed information about victim-offender relationships *and* about the characteristics, experiences, and lifestyles of people in those relationships.

The question arises as to how the current study findings might be used to reduce violence against women. At the very least they could be used as the basis of a risk assessment tool to identify women at risk of violence who might benefit from services and supports designed to reduce the risk of violence. Such an application could proceed without making any assumption about the causal status of the identified risk factors. The strength of the evidence presented here, however, suggests that it might be timely to develop and evaluate programs designed to reduce personal and financial stress and/or strengthen social support. This recommendation should not be construed as a suggestion that the current approach of prosecuting offenders in cases of violence against women should be softened. Programs directed at reducing the underlying risk factors for violence victimisation do not have to be offered as alternatives to criminal prosecution where violence has already occurred. They can be offered as a primary prevention measure or used to reduce the risk of recidivism among those who have been convicted of assaulting family members or intimate partners. These are areas where, on the available evidence, we currently lack any form of effective intervention (Feder, Wilson & Feder, 2008; Davis, Weisburd & Taylor, 2008).

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NOTES

1 For all three models, the same substantive results were found (in relation to the significance, direction and magnitude of the effect) if the number of items with valid response required for a non-missing financial stress score was increased from one to six.

2 For all three models, the same substantive results were found (in relation to the significance, direction and magnitude of the effect) if the number of items with valid response required for a non-missing personal stress score was increased from one to nine.

3 For all three models, the same substantive results were found (in relation to the significance, direction and magnitude of the effect) if the number of items with valid response required for a non-missing social networks score was increased from eight to ten.

4 Responses to the frequency of drinking were converted to number of drinking occasions per week in the following way: 0 - 'no, I have never drunk alcohol'; 0 - 'no, I no longer drink alcohol'; 7 - 'yes, I drink alcohol every day'; 5.5 - 'yes, I drink alcohol 5 or 6 days per week'; 3.5 - 'yes, I drink alcohol 3 or 4 days per week'; 1.5 - 'yes, I drink alcohol 1 or 2 days per week'; 0.5 - 'yes, I drink alcohol 2 or 3 days per month'; 0.25 - 'yes, but only rarely'. Responses to the intensity of alcohol consumption was converted to number of alcoholic drinks per occasion in the following way: 13 -'13 or more standard drinks'; 11.5 - '11 to 12 standard drinks'; 9.5 - '9 to 10 standard drinks'; 7.5 - '7 to 8 standard drinks'; 5.5 - '5 to 6 standard drinks'; 3.5 - '3 to 4 standard drinks'; 1.5 - '1 to 2 standard drinks'. Additionally, for respondents who reported their frequency of drinking as 'no, I have never drunk alcohol' or 'no, I no longer drink alcohol', number of alcoholic drinks was coded 0.

5 All statistical analyses presented in the current study do not take into account HILDA's sample design characteristics (for example, stratum and cluster) or weights. Therefore, percentages presented are not nationally representative of Australian residents but rather reflect the current study samples.

6 Substantive results (in relation to statistical significance and the direction and size of effects) were not altered by specifying an exchangeable covariance matrix and/or estimating bootstrapped standard errors.

7 Age was not included as a time-varying factor as age changes over time in the same way for all persons. There was no substantial change over time between all categories of marital status. Thus, marital status was aggregated to partnered (married or de facto) or not partnered (separated, divorced, widowed and never married/not de facto). Pregnancy in the past year was not included in the fixed effect model as it is already a change/transition variable.

8 Survey year was not included in the final model as it was not significant at the 0.05 level.

9 Survey year was not included in the final model as it was not significant at the 0.05 level.

10 We would have to suppose that women who experience personal or financial stress tend to have partners who are dominating and/or controlling. There is little a priori reason to suspect this. Weatherburn (2011) found the variables just mentioned exerted strong cross-sectional effects even in the presence of controls for 'personal autonomy' (a variable measuring a woman's perceived freedom from external domination and control).

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APPENDIX

Table A1. Person response status for women who participated in HILDA for any wave between 2002 and 2009

	Pooled waves	Year of wave *t*							
	2002 to 2009	2002	2003	2004	2005	2006	2007	2008	2009
All records	**115,032**	**14,379**	**14,379**	**14,379**	**14,379**	**14,379**	**14,379**	**14,379**	**14,379**
Entered study before or at wave *t*	98,409	10,664	11,182	11,625	12,098	12,587	12,995	13,394	13,864
Excluded: *not entered study at or before wave t*	16,623	3,715	3,197	2,754	2,281	1,792	1,384	985	515
Aged 15 yrs or older at wave *t*	80,268	8,296	8,802	9,309	9,791	10,347	10,784	11,227	11,712
Excluded: *less than 15 yrs old at wave t*	18,141	2,368	2,380	2,316	2,307	2,240	2,211	2,167	2,152
Interviewed at wave *t* (in person or by phone)	54,138	6,819	6,694	6,536	6,730	6,826	6,786	6,764	6,983
Excluded: *out of scope/not interviewed* [a]	26,130	1,477	2,108	2,773	3,061	3,521	3,998	4,463	4,729
Responded to self-completion questionnaire at wave *t*	49,322	6,395	6,225	6,062	6,124	6,251	6,102	6,000	6,163
Excluded: *did not respond to self-completion questionnaire*	4,816	424	469	474	606	575	684	764	820
Cross-Sectional Model: Valid response to violence item at wave *t*	48,368	6,264	6,111	5,952	6,008	6,126	5,977	5,876	6,054
Longitudinal Model B: Sub-sample: change in violence item across waves	3,069	353	376	386	395	410	382	385	382
Excluded: *invalid response to violence item at wave t* [b]	954	131	114	110	116	125	125	124	109
Longitudinal Model A: Valid response to violence item at wave *t+1*	42,030	5,331	5,237	5,189	5,276	5,288	5,136	5,142	5,431
Excluded: *not interviewed at wave t+1*	3,483	626	590	418	406	424	385	315	319
Excluded: *did not respond to self-completion questionnaire at wave t+1*	2,275	240	212	271	260	327	368	339	258
Excluded: *invalid response to violence item at wave t+1* [b]	580	67	72	74	66	87	88	80	46

[a] The most common reasons for out of scope or not interviewed were 'household not issued to field - persistent non response' and 'out of scope - temporary sample member no longer living with a permanent sample member'.

[b] Due to implausible values, multiple responses to self-completion questionnaire or refused/not stated.

Table A2. Financial stressors and bi-variate relationships with wave t and wave t+1 violence, women only

	Wave *t* violence			Wave *t+1* violence		
		Violence within row			Violence within row	
Financial stressor	N Total	N victims	Percent victims	N Total	N victims	Percent victims
Could not pay electricity, gas or telephone bills on time						
Yes	6,929	347	5.0	5,705	218	3.8
No	40,465	473	1.2	35,525	348	1.0
Missing	974	18	1.9	800	11	1.4
Could not pay the mortgage or rent on time						
Yes	3,135	183	5.8	2,553	121	4.7
No	44,011	627	1.4	38,481	442	1.2
Missing	1,222	28	2.3	996	14	1.4
Pawned or sold something						
Yes	1,953	201	10.3	1,590	96	6.0
No	45,291	609	1.3	39,520	467	1.2
Missing	1,124	28	2.5	920	14	1.5
Went without meals						
Yes	1,658	193	11.6	1,322	106	8.0
No	45,591	618	1.4	39,793	457	1.2
Missing	1,119	27	2.4	915	14	1.5
Was unable to heat home						
Yes	1,303	124	9.5	1,080	71	6.6
No	45,890	686	1.5	39,998	490	1.2
Missing	1,175	28	2.4	952	16	1.7
Asked for financial help from friends or family						
Yes	6,662	374	5.6	5,423	217	4.0
No	40,716	445	1.1	35,799	347	1.0
Missing	990	19	1.9	808	13	1.6
Asked for help from welfare or community organisations						
Yes	1,796	188	10.5	1,440	124	8.6
No	45,446	618	1.4	39,669	438	1.1
Missing	1,126	32	2.8	921	15	1.6

Note. All chi-square tests of association between financial stressors and wave *t* or *t+1* violence were significant at the 0.05 level.

Table A3. Personal stressors and bi-variate relationships with wave t and wave t+1 physical violence, women only

	Wave *t* violence			Wave *t+1* violence		
		Violence within row			Violence within row	
Personal stressor	N Total	N victim	Percent victim	N Total	N victim	Percent victim
Serious injury/illness to family member						
Yes	8,750	240	2.7	7,701	138	1.8
No	39,422	586	1.5	34,173	434	1.3
Missing	196	12	6.1	156	5	3.2
Death of spouse or child						
Yes	502	29	5.8	401	10	2.5
No	47,729	801	1.7	41,523	566	1.4
Missing	137	8	5.8	106	1	0.9
Death of close relative/family member						
Yes	5,558	179	3.2	4,772	105	2.2
No	42,687	651	1.5	37,163	469	1.3
Missing	123	8	6.5	95	3	3.2
Death of a close friend						
Yes	5,278	159	3.0	4,539	79	1.7
No	42,955	667	1.6	37,387	495	1.3
Missing	135	12	8.9	104	3	2.9
Retired from the workforce						
Yes	1,121	36	3.2	972	20	2.1
No	47,168	796	1.7	40,999	556	1.4
Missing	79	6	7.6	59	1	1.7
Major worsening in finances						
Yes	1,464	109	7.5	1,222	70	5.7
No	46,822	723	1.5	40,748	506	1.2
Missing	82	6	7.3	60	1	1.7
Fired or made redundant						
Yes	1,162	74	6.4	977	41	4.2
No	47,098	753	1.6	40,981	533	1.3
Missing	108	11	10.2	72	3	4.2
Changed jobs						
Yes	6,512	181	2.8	5,421	114	2.1
No	41,747	650	1.6	36,534	462	1.3
Missing	109	7	6.4	75	1	1.3
Changed residence						
Yes	8,475	328	3.9	6,985	194	2.8
No	39,823	507	1.3	34,997	382	1.1
Missing	70	3	4.3	48	1	2.1

Note. All chi-square tests of association between personal stressors and wave *t* or *t+1* violence, except for wave *t+1* violence and death of spouse/child and retired from the workforce, were significant at the 0.05 level.

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