

## **Who provides care? An event history analysis of the effect of sex and relationship status on the provision of informal care in Australia**

### **ABSTRACT**

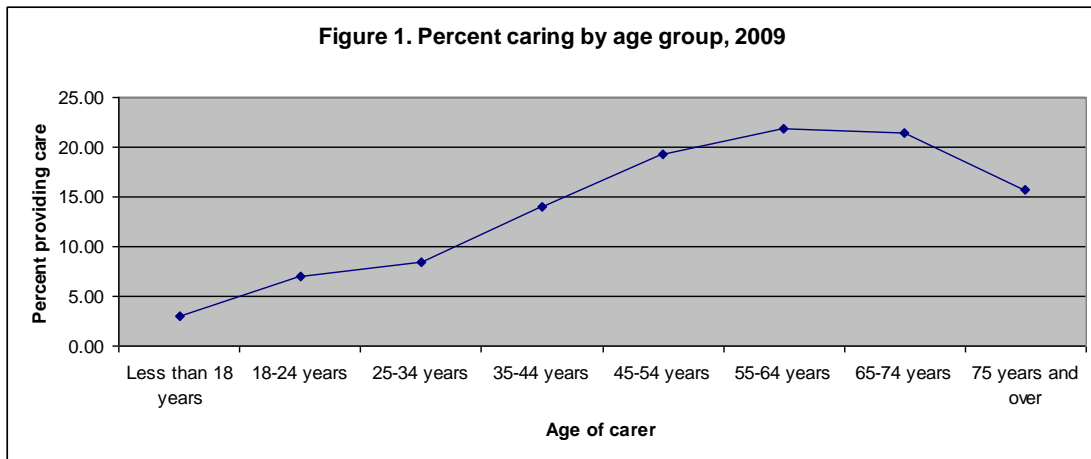
Informal care provided by family members is the most common form of care for people with disabilities or long term health problems in Australia. The ageing of the Australian population is likely to increase demand for care, and increase the number of Australians providing informal care. It is therefore important to understand who is likely to provide informal care, and at what age Australians are most 'at risk' of providing care for family members. This paper assesses the different patterns of providing care by men and women, and by relationship status. As a longitudinal survey, the Household, Income and Labour Dynamics in Australia (HILDA) survey provides an opportunity to examine patterns of care over time. Event history analysis is used on data from waves 5-9 (years 2005-2009) of the HILDA survey. A discrete time hazard model, controlling for other socio-economic factors, shows that women are significantly more likely to provide informal care than men and that people living with a partner are more likely to provide care than singles. Survival analysis is used to provide the hazard and survivor functions: the hazard function illustrates the conditional probabilities that men, women, singles and those living with a partner are at risk of providing care at each age, and the survivor function provides the proportion not providing care at each age. Findings from the survival analysis indicate that there are statistically significant differences in survival time between all combinations of sex and relationship status, except between single men and single women.

## INTRODUCTION

In 2009 in Australia, there were 2.6 million carers providing assistance to those who needed help due to disabilities, long term health problems or old age (Australian Bureau of Statistics [ABS], 2009). This informal care, generally provided by family members, is one of the most common forms of care for people with disabilities, long term health problems and the frail aged in Australia. Previous studies have shown that in comparison to non carers, informal carers may experience higher levels of depression, lower levels of subjective well being, poorer physical health, more financial hardship, and lower levels of labour force participation (Cummings, Hughes et al. 2007; Australian Bureau of Statistics 2008; Edwards, Higgins et al. 2008; Access Economics 2010). Given the prevalence of informal care in Australia and its potential impact on carers, it is crucial to examine who is likely to provide informal care, and at what age Australians are most 'at risk' of providing care.

Research continually shows that Australian women still do the majority of unpaid domestic work, despite significantly increasing their labour force participation (de Vaus, 2009). Nurturing and care giving in particular are still often seen as inherently female roles. It is not surprising then, that women provide more informal care to people with disabilities, long term health problems and the frail aged than men do. The ABS (2009) reports that 55 percent of all carers are women and 45 percent are men. This gender difference is even more pronounced for primary carers, 68 percent of whom are women. Other studies report similar findings of gender discrepancies in the provision of care, with women providing more care and also experiencing more negative consequences as a result of providing care (Edwards, Higgins et al. 2008; Nepal, Brown et al. 2009).

It has been established that the need for care is highest at the oldest ages (ABS, 2008). Previous research has also found that the likelihood of providing informal care steadily increases as people age, with a peak around ages 45-64 when people are most likely to be providing care (de Vaus, 2004: 251). Recent data from the ABS Survey of Disability, Ageing and Carers (2009) illustrates the distribution of Australians providing care by age. These data suggest that peak ages of providing care are slightly older, at around 55-74 years.



Source: ABS Survey of Disability, Ageing and Carers (SDAC), 2009.

An earlier report on the SDAC (ABS, 2003) showed that 91 percent of primary carers were related to the people they care for. Just under half (42 percent) of all carers were caring for a partner, 26 percent were caring for a parent and 23 percent were caring for a child (with disabilities or other long term medical conditions). The fact that such a high proportion of carers were caring for partners suggests that having a partner may be a predictor of the risk of providing care.

The studies mentioned so far are generally based on single or repeated cross sectional data. While there is no doubt that the information gained from such studies is very valuable, looking at this issue longitudinally provides the opportunity to further enrich our understanding of who provides care. This paper will use longitudinal data and research methods to demonstrate that sex and relationship status are significant predictors of when (if at all) in the life course people are most likely to provide informal care.

## DATA AND METHOD

### DATA

The data set used in this study is HILDA release 9.0. HILDA is a nationally representative longitudinal survey conducted yearly in Australia since 2001. Information from the 'responding person' files of waves 5-9 (years 2005 – 2009) has been used to create a person-period data set, suitable for longitudinal analysis. Waves 1-4 were not included in this analysis because they did not ask respondents if they provided care.

Given that this paper uses an event history analysis approach, the first data issue that must be clarified is the event of interest. The event of interest in this analysis is the first reported instance of providing informal care. The caring event variable is a dichotomous variable created by merging responses to two questions. These questions asked if respondents provided care to a household member, or to someone living elsewhere who required assistance on an ongoing basis due to a long-term health condition, disability or old age. The variable was coded 0 = not providing care and 1 = providing care. Because it is the first reported instance of providing care that is of interest, if a respondent reports providing care in more than one wave, all but the first instance are coded as missing.

The next data point requiring clarification is the measurement of time. As this paper is interested in the incidence of caring over the life course rather than caring over the years 2005-2009, age of respondents is used as the time variable, rather than the wave or year of study. Because age of respondents is measured in the same metric (years) as the data is collected, using age as the time variable is acceptable.

A number of independent variables were used in various aspects of this analysis. These variables were recoded or created as dichotomous variables. They include sex, relationship status, labour force status, ethnicity and whether or not the respondent had a resident child. Sex was recoded as 0 = female, 1 = male. The dichotomous relationship status variable was created using the marital status question. It was coded as 0 = not living with a partner (referred to as single) and 1 = living with a partner. Labour force status was created from the broad employment status variable. For this

variable 0 = not in the labour force, 1 = in the labour force. Country of birth was used as a proxy for ethnicity, with 0 = not born in Australia and 1 = born in Australia. Finally respondents without a resident child were coded as 0 and those with a resident child were coded as 1.

## **DATA ISSUES**

It is likely that this paper underestimates the number of people providing care. This is due to low self reporting, a strict definition of care and data censoring.

Self reporting of providing informal care may have impacted the measurement of provision of care. Many people providing care (especially if they are not a primary carer) may not self identify as carers, even if they meet the criteria provided. This can be for a wide range of reasons, which have been detailed in the report ‘Who Cares? Report on the inquiry into better support for carers’ (Standing Committee on Family 2009).

The definition of caring given to HILDA respondents is somewhat stricter than other definitions. HILDA respondents are told that providing assistance with self-care, mobility and communication in own language are the only activities to be considered when answering the provision of care questions (See Showcard K7, The Melbourne Institute). The ABS, on the other hand, identifies the following activities as activities that carers can provide assistance with;

- Self care
- Mobility
- Communication
- Cognition or emotion
- Paperwork
- Transport
- Housework
- Property maintenance
- Meal preparation

This is not intended to be a critique of the limitations put on the definition of caring activities by the HILDA survey, it is simply highlighting that there are arguably more

activities that could be included. The exclusion of these activities may preclude some carers from identifying as such.

It is also essential to note that the data used in this study is both left and right censored. Left censoring occurs when an unknown number of respondents experience the event of interest before the survey period and right censoring is when respondents experience the event after the survey period (Singer and Willett 2003). It is extremely likely that a number of respondents experienced their first event of provision of care before they entered the HILDA survey, and it is also likely that many will experience their first event afterwards.

## **METHOD**

This paper uses an event history approach to explore the issues outlined previously. Event history analysis is appropriate for studies which ask questions about event occurrence, specifically whether events occur or when events occur (Singer and Willett 2003). This paper asks whether certain groups of people provide care and if so when in their life course do they provide care, which makes event history analysis a useful approach.

It is important to state here that the terminology of some aspects of event history analysis can seem to attach a negative value to the event of interest. This is because survival analysis was traditionally used in medical studies. Therefore, statements like 'at risk', 'hazard' or 'proportion surviving' are not intended to be negative value statements. They are simply the relevant terminology and are just as applicable for positive events (Kleinbaum and Klein 2005).

Survival analysis is used to provide the hazard and survivor functions: the hazard function will be used to illustrate the conditional probabilities that men, women, singles and those living with a partner are at risk of providing care at each age, and the survivor function will provide the proportion not providing care at each age. Findings from the survival analysis will also indicate whether or not there are statistically significant differences in survival time between all combinations of sex and relationship status. For ease of interpretation, the hazard functions shown have been smoothed.

Finally, a discrete time hazard model, controlling for other socio-economic factors, will use logistic regression to produce odds ratios. These odd ratios will illustrate the relative odds of providing informal care for women, men, single people, and people living with a partner.

## RESULTS

### DESCRIPTIVE RESULTS

Before delving into the results of the event history analysis, it is preferable to examine some of the descriptive information about informal care available in the HILDA survey. 2005 was the first year HILDA respondents were asked about their caring responsibilities. In 2005 921 respondents (7.2 percent) reported that they provided informal care to someone in their household or living elsewhere. The number and proportion of respondents providing care remained relatively stable over the following years with a slight decrease by 2009, when 897 respondents (6.7 percent) reported providing care, a reduction of 0.5 percent from 2005.

Considering data from all five waves together, slightly more respondents reported providing care to household members than to people who lived elsewhere. The majority of respondents who reported providing care to a household member were caring for a spouse/partner (45 percent). 18 percent of respondents reported caring for a young child, 17 percent for a parent and 10 percent for an adult child (aged over 15).

For respondents providing care to someone who does not live in the same household (a non resident) the most common recipient of care was a parent (51 percent). Only two percent of respondents caring for a non resident person provided care to a partner. The fact that most in home care is provided to partners and most non resident care is provided to parents is not surprising given that respondents are much more likely to be living with a partner than a parent.

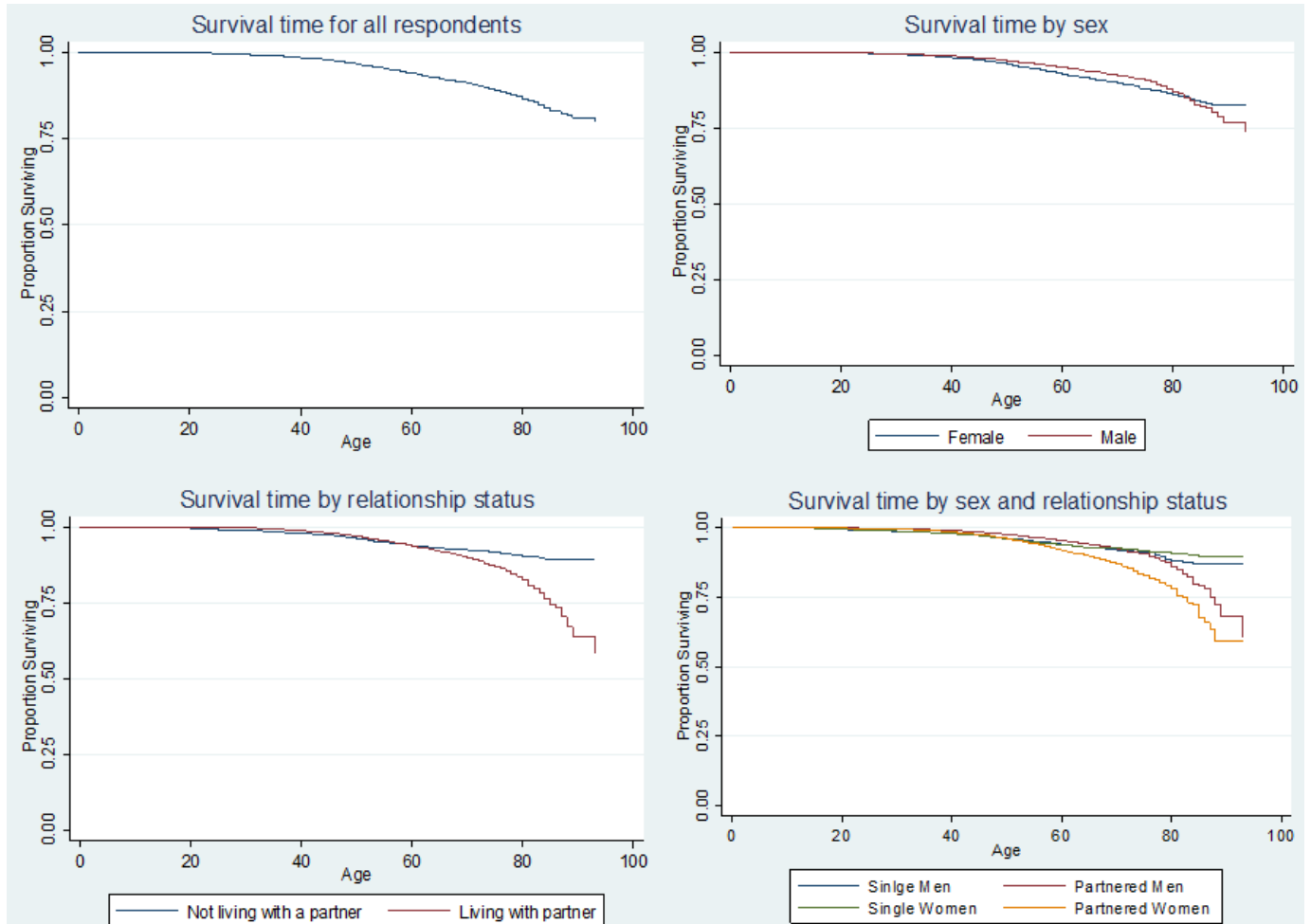
### SURVIVAL ANALYSIS, THE SURVIVOR FUNCTION

The survivor function  $S(t_{ij})$ , is the probability that the individual  $i$  will survive (i.e. not provide any care) past time period  $j$  (Singer and Willett 2003). As outlined in the methods section, the survivor function allows us to see the cumulative proportion of respondents who have not provided care across the life cycle, for different groups of people. The first graph in Figure 2 (top left) shows the survivor function for all respondents across the life course. We can see that the proportion surviving is quite high across most of the life course. Respondents begin experiencing the event (providing care for the first time) in their thirties. By the end of the life course around



three quarters of the respondents have ‘survived’ meaning just less than one quarter have provided care.

Figure 2. Survivor functions



Source: HILDA survey, waves 5-9

The second graph in Figure 2 demonstrates how the survivor function differs across the life course for men and women. It shows that more women provide care than men until around age eighty when male survival drops below female survival. In other words, more women provide care throughout the majority of the life course, but in old age the proportion of men who have provided care overtakes the proportion of women. Significance testing tells us that the differences in survival time between men and women are statistically significant at the  $p < .001$  level.

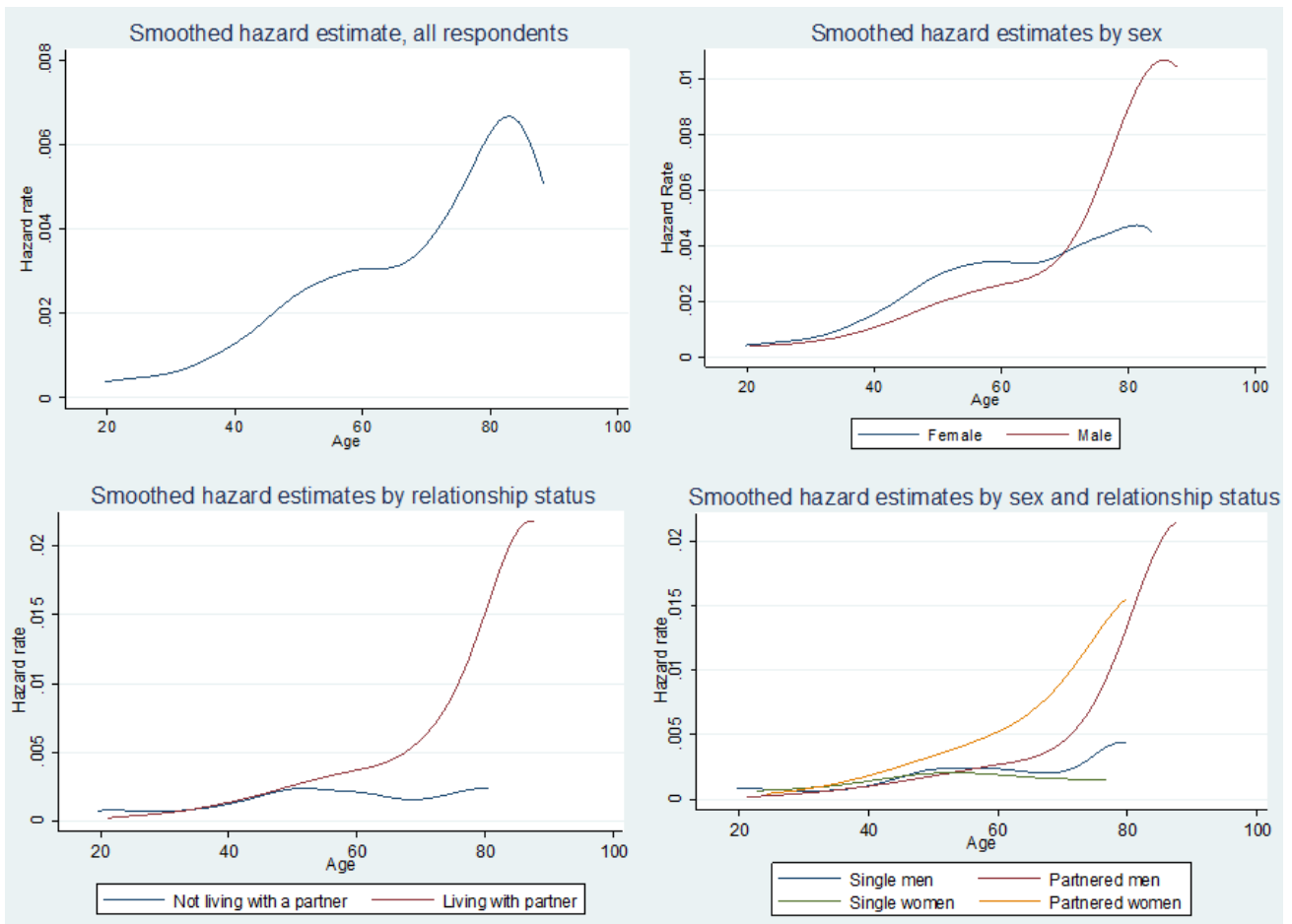
The third graph in Figure 2 illustrates the different survivor functions for single people and people living with a partner. This graph shows that the provision of care later in life is dramatically higher for people living with partners than it is for singles. This is not the case earlier in the life course; the survivor functions are very similar for both groups until around age sixty, when the incidence of providing care rises quite dramatically for those living with a partner. Significance testing demonstrates that the differences in survival time between single people and those living with a partner are statistically significant at the  $p < .001$  level.

The final graph in Figure 2 displays the survivor function for single men, single women, partnered men and partnered women. Not surprisingly, partnered women have the lowest proportion surviving of all the groups. Partnered men follow a similarly shaped survivor curve as partnered women, but have a statistically significant higher proportion surviving. Single men and single women have the highest proportions surviving; and it is interesting to note that the differences in survival time between single men and women are not statistically significant.

### **SURVIVAL ANALYSIS, THE HAZARD FUNCTION**

The hazard function,  $H(t_{ij})$ , is the conditional probability that individual  $i$  will experience the event (first provision of care) in time period  $j$ , given that the individual has not experienced the event in any prior time period (Singer and Willett 2003). As outlined previously, the hazard function allows us to view the relative risk of providing care across the life cycle, for different groups of people. The first graph (top left) in Figure 2 illustrates the smoothed hazard rate for all respondents. We can see that the hazard of providing care increases steadily as respondents age, with a clear peak around age eighty. This suggests that as a whole, respondents are most at risk of providing care later in life.

Figure 3. Hazard functions



Source: HILDA survey, waves 5-9

The second graph in Figure 2 shows how the hazard function differs across the life course for men and women. The hazard of women providing informal care is higher than men's until around age seventy, when the male hazard function of providing care dramatically increases. Unlike the male hazard rate, which has a clear single peak in the seventies, the female hazard rate has two separate peaks. The first is in the fifties, the risk of providing care then stabilizes until the late seventies where it rises again.

The third graph in Figure 2 illustrates the different hazard rates for single people and people living with a partner. This graph demonstrates very clearly that the risk of providing care is dramatically higher for people living with partners than it is for singles. However this is not the case for younger people, the hazard rates are almost identical until around age fifty, which is when the risk of providing care rises quite dramatically for people living with a partner.

The final graph in Figure 2 displays the hazard function for single men, single women, partnered men and partnered women. Predictably, partnered women are clearly the group most at risk of providing care for the majority of their lives. Partnered men do eventually become the most at risk, but only for a short period of time after the age of eighty. Similar to the survival estimates, single men and single women have a relatively low risk of providing care across the life course.

### DISCRETE TIME HAZARD MODEL

Table 1 presents the results of the discrete time hazard model. The results shown for each of the five models are odds ratios and standard errors, estimated from logistic regression. Model A includes only the main effect of age on provision of care; Model B includes the main effects of age and relationship status; Model C includes the main effects of age and sex; Model D includes the main effects of age, relationship status and sex; and Model E includes the main effects of age, relationship status, sex, labour force participation, having a resident child and ethnicity. It is worthwhile to reiterate here that because age is being used as the time measurement, age cannot be re-entered as a continuous predictive variable.

Table 1. Discrete time hazard model of first provision of informal care

	Model A	Model B	Model C	Model D	Model E
Age group 15-24	1.902 (0.907)	1.872 (0.893)	1.905 (0.909)	1.866 (0.890)	1.861 (0.888)
Age group 25-34	0.913 (0.263)	0.911 (0.263)	0.974 (0.281)	0.968 (0.279)	1.418 (0.411)
Age group 35-44	1.208 (0.347)	1.144 (0.330)	1.285 (0.370)	1.195 (0.345)	1.866* (0.543)
Age group 45-54	1.902* (0.541)	1.790* (0.511)	2.020* (0.575)	1.865* (0.533)	2.959*** (0.856)
Age group 55-64	2.896*** (0.821)	2.738*** (0.779)	3.095*** (0.878)	2.879*** (0.819)	4.618*** (1.329)
Age group 65-74	2.982*** (0.849)	2.825*** (0.806)	3.198*** (0.911)	2.982*** (0.852)	4.011*** (1.149)
Age group 75-84	2.374**	2.247**	2.529***	2.356**	2.491**

	(0.683)	(0.649)	(0.728)	(0.681)	(0.720)
Age group 85-94	2.181**	2.106*	2.276**	2.180**	2.192**
	(0.638)	(0.617)	(0.666)	(0.639)	(0.642)
Relationship Status		1.121*		1.156**	1.188***
		(0.052)		(0.053)	(0.057)
Sex			0.682***	0.676***	0.728***
			(0.029)	(0.029)	(0.032)
Labour Force Status					0.559***
					(0.029)
Has resident child					0.976
					(0.050)
Born in Australia					1.158**
					(0.060)
Goodness-of fit					
Log Likelihood	-9841.807	-9838.675	-9801.090	-9796.106	-9728.443
n observations	59093	59093	59093	59093	59080
n parameters	8	9	9	10	13

~p<.10; \*p<.05, \*\*p<.01: \*\*\*p<.001. Note: Age group 95+ omitted because of collinearity

Source: HILDA survey, waves 5-9

Looking at models B and C, where the effects of sex and relationship status are regressed unaccompanied by other predictive variables, we can see that both have a strong, statistically significant impact on the risk of providing care. Specifically, the odds of women providing care are higher than the odds of men providing care, and the odds of partnered people providing care are higher than the odds of singles doing so. As more predictive variables are included in the models these findings increase in strength slightly and retain their statistical significance.

Model E contains all the relevant predictive variables and is therefore the most appropriate to examine in depth. Because it includes all the relevant variables it demonstrates the effects of the variables of interest (sex and relationship status) whilst controlling for other socio-economic factors. Firstly, we can see that the odds of providing care seem to be lowest at the younger age groups (but not statistically

significant), highest around age groups 45-54 and 65-74 and then lower again at the oldest age groups.

The odds ratio for relationship status in Model E is 1.188. This means that, controlling for other socio-economic factors, the odds for partnered people of providing care are 1.19 times the odds of providing care for single people.

The odds ratio for the other key variable of interest, sex, in Model E is 0.728. This means that, again controlling for other socio-economic factors, the odds of men providing care are 73 percent of the odds of women providing care.

The other predictive variables included in Model E were labour force participation, having a resident child and ethnicity. An odds ratio of 0.559 for labour force participation tells us that the odds of people in the labour force providing care are just more than half of the odds of people who are not in the labour force providing care. Interestingly, the effects of having a resident child on provision of care are not statistically significant. Finally, the odds of people born in Australia providing care are 1.16 times the odds of people born overseas.

## CONCLUSION

The results of this study support evidence from previous research that being a woman and living with a partner increase the risk of becoming an informal care provider. The graphing of the survivor and hazard functions as well as the discrete time hazard model all indicate that partnered women are the group most likely to be providing informal care. They also demonstrate that sex and relationship status have a significant impact on when in life people are most at risk of providing care.

It was not surprising that the general risk of providing care increases from around ages 45 onwards. The two biggest groups that respondents provide care for are partners and parents, and we know from previous research that the need for care increases with age. It makes intuitive sense then, that from ages 45 onwards people are more likely to have a parent or partner who requires care.

One of the more intriguing findings of this study is that while women are likely to provide more care overall, men provide more care in the later years of life. It has been suggested that this occurs because of the discrepancy between male and female life expectancies in Australia, and the fact that women often partner with men that are older than them (Australian Bureau of Statistics 2008). Women in the older age groups are therefore more likely to be widowed, whereas older men are more likely to be living with a spouse. This would leave older males more at risk of providing care because, as has been demonstrated in this paper, living with a partner greatly increases the risk of providing care.

Overall, this paper contributes to our understanding of the provision of informal care in Australia by using a longitudinal approach. Event history analysis has allowed us to see how sex and relationship status can predict survival time until first provision of care, the hazard of providing care at different ages, and the strength and significance with which sex and relationship status predict the hazard of provision of informal care.

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