

**Labour Force Participation of Families Coping with a Disabling Condition**

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Published

2015

Journal Title

Economic Analysis and Policy

Version

Accepted Manuscript (AM)

DOI

[10.1016/j.eap.2014.12.002](https://doi.org/10.1016/j.eap.2014.12.002)

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## **ABSTRACT**

This study examines the association between labour force participation and residing with an individual diagnosed with a disabling condition. The analysis, based on data collected in the Survey of Disability, Ageing and Carers 2009, is confined to family members of working age without a disabling condition. The stratification of the analysis by gender shows a significant and positive responsiveness to labour participation among females when residing with a family member experiencing either a disabling cancer condition or musculoskeletal condition. The presence of a mentally ill family member reduced male propensity to participate in the labour market. Flexible work arrangements that allow family members opportunities to provide adequate caregiving and financial support to ill relatives are fundamental to the sustainability of health care programs.

**Keywords:** Labor participation; Disabling condition; Cancer; Musculoskeletal; Mental health; Family.

**Classification Codes:** J2; I1; D130

## 1. INTRODUCTION

Disease and disability impose significant costs on society through increased health system use, reduced quality of life, and lost productivity (Australian Institute of Health and Welfare, 2010). In recent years, the aging of Australia's population, longer duration of illness, and national policy emphasis towards home-based care, has placed greater financial and care burdens on families coping with a disabling condition. The Australian Government's emphasis on home-based care has led to informal care (i.e. unpaid care and support) by family and friends becoming an increasingly important source of support to frail and disabled Australians (Courtney, Minichiello and Waite, 1997; Victorian Parliament, 1997; Queensland Health, 2004). Advancements in health care mean that people are living longer with debilitating conditions (Bosanquet & Sikora, 2004; Woolf, Vos, & March, 2010). Consequently, the duration of care giving by family members continues to increase.

This paper examines the labour force participation of family members to determine the impact of residing with individuals afflicted with a disabling health condition. Analysis is based on nationally representative data that captures information on a range of disabling conditions (cancer, cardiovascular disease, mental disorders, chronic respiratory diseases, diabetes, injuries, and musculoskeletal diseases) identified by the Australian Institute of Health and Welfare (AIHW) as leading contributors of Australia's burden of disease (Australian Institute of Health and Welfare, 2010). Recognising that specific health conditions may impact on family labour supply differently, analysis is used to determine the impact of each condition on labour market outcomes. Cost of illness studies would benefit from an understanding of the indirect costs of ill health associated with the labour participation of family members.

## 2. LITERATURE REVIEW

Little is known about labour market decisions of family members living with people experiencing a specific health condition. Most investigations relating to health and family labour supply focus on non-specific health conditions with particular emphasis on the change in the labour supply of the primary carer, usually female, in response to a family health shock. Living with disabled children (Gould, 2004; B. Wolfe & Hill, 1995) or elderly parents (Ettner, 1995) has been shown to reduce women's labour force participation. Gould (2004) explores how children's health influences the wages and work hours of their mothers. Evidence shows that after controlling for the financial burden of illness, single mothers work

fewer hours if their child has a time-intensive illness. Married mothers are less likely to work and work fewer hours if their children have a severe condition with an unpredictable time component.

Related research shows that financial constraints associated with the poor health of a family member often induce women to work more. Investigating the role of a husband's poor health on the wife's labour force participation, O'Hara (2004) concludes that the wife is more likely to work when the husband's health deteriorated from excellent to poor. A similar study, investigating married women's allocation of time to employment and care of elderly parents, revealed little evidence of a reduced propensity to be employed or reduction in hours worked (Wolfe & Soldo, 1994). Berger and Fleisher (1984) find that married women tend to increase labour supply when their husbands are in poor health unless their husbands' lost income is supplemented by government transfers. Studies (Berger & Fleisher, 1984; Spiess & Schneider, 2003) also report a link between higher government transfer payments and lower labour force participation among primary carers. Carmichael and Charles (2003) identify a direct negative relationship between caregiving commitment and labour force participation for female carers, though not male. This supports their previous findings that caring may both constrain female labour supply and reduce earnings (Carmichael & Charles, 1998).

Roberts (1999) extends the cost-of-illness research to include other family members in addition to the primary carer. Evidence shows that adult males demonstrate an increased probability of labour force participation in the presence of mental illness in the family when the mental illness is accompanied by a chronic physical illness. No impact is found regarding the female's probability of labour force participation when a family member is afflicted with a mental illness. When the ill family member is afflicted with additional illnesses, hours of work for both female and male family members are reduced (Roberts, 1999). A similar study (Vecchio, 2007) finds that among families where a member is afflicted with a mental disability, females are less likely to participate in the labour force. Male members of families coping with a mental disability were more likely to withdraw from the labour market when receiving a government transfer payment.

In recent years, studies have documented the impact of specific health conditions on the labour supply of family members. Research by Sherwood et al. (2008) indicates that for brain tumour patients, younger caregivers are more likely to be employed. These caregivers are more likely to report lost hours from work when care recipients required assistance with instrumental activities of daily living and are closer to the time of diagnosis. Murphy,

Flowers, McNamara, and Young-Saleme (2008) demonstrates that the work force participation of fathers with a child diagnosed with cancer increases relative to the control group. The authors conclude that the psychological factors related to dealing with grief and financial matters were the primary motivations for increased work participation.

### 3. THEORETICAL MODEL

Time allocation models provide a theoretical explanation of household labour supply in the presence of an ill family member. According to these models individuals maximise their utility by allocating time between home and market activity (Becker, 1965). Extending Becker's time allocation model, a family member's health is a commodity produced in the home, with a combination of time-intensive and earnings-intensive goods. An individual's labour supply is affected in the presence of an ill family member, subject to time and budget constraints. A family's utility function is maximised when the optimal demand for time-intensive versus earning-intensive goods are achieved.

According to Roberts (1999), the presence of an ill family member raises the productivity of those engaged in household production, with a greater amount of time devoted to care giving, a reduction in leisure time, and an ambiguous effect on labour market time. The optimal time allocation between labour market and care giving time will vary as wages vary (Roberts, 1999). With the goal of maximising the family's utility, individuals with relatively low wages may devote more time to producing time-intensive goods performed via household duties. A change in either an individual's market wage or their productivity in the home brings about a change in the relative price of competing uses of the individual's time. Income and substitution effects alter the mix of home and market activity to optimally allocate time in order to maximise the family's utility.

The rising level of the wage of a member who is already in the market has a two-fold effect on this member. The substitution effect encourages the substitute of less profitable hours of home activity with more profitable hours of market activity. The income effect encourages the individual to decrease the hours of market activity. An increase in income of one member also lifts the income of the entire household. This in turn will have a negative income effect on the other members in the household.

There is also a cross-substitution effect, which is the change in the labour supply of one household member as a result of a rise in the wage of another. The cross-substitution effect can be either positive or negative, as the direction depends on whether the hours of market

activity of members are substitutes or complements (Kaufman & Hotchkiss, 2003). If they are substitutes, it does not matter who in the household undertakes market activity as long as a certain amount of income is achieved. If additional hours of market work are complements, utility is achieved when they are performed together. Further explanation can be found in Saczuk (Saczuk, 2013).

Considering that care as a commodity is produced at the home, this study attempts to elucidate how the presence of an individual with a disabling condition affects the labour supply of other family members. The expected reallocation of the family member's time between home and market activity is ambiguous. An illness may be expensive to treat thereby potentially increasing the incentives of healthy family members to participate in paid employment. Furthermore, if an ill family member withdraws or reduces time devoted to market activities, then other family members may act as substitutes by increasing their participation in market activities. Conversely, an ill individual may require extra care that involves family members taking time out of the labour market.

The effects on labour supply will depend on the magnitudes of the competing caregiving and income effects. The direction and significance of the labour participation coefficient is partly dependent on the type of disabling condition experienced within the family. For instance, given that cancer conditions often involve intensive and long-term treatments, the private cost of this condition to the family is likely to be relatively high. Therefore, within these families more time may be allocated towards market activity. In contrast, lower levels of mental health support services may prompt families to allocate more time towards caregiving activities.

Since the acquisition of a disabling condition does not discriminate between siblings, spouses, parents, or children, this study is interested in the impact of illness of any individual in the family. For this reason this study does not examine the added worker effect<sup>1</sup> (that is, a response to a loss of income due to illness) but instead focuses on the probability of labour force participation among family members residing with an ill individual regardless of the ill individual's employment history. By doing so this study obtains a general understanding of

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<sup>1</sup> Models of family utility maximisation suggest that reduced family income due to the earning losses of one family member may be offset by increases in the labour supply of other family members. The household labour supply increase in response to a reduction in the household income is known as the added worker effect and is usually estimated in the literature by the increase in the labour supply of married women whose husbands have become unemployed. Underlying the theory is the assumption that married women are secondary workers with a less permanent attachment to the labour market than their partners. The observed effect can be weak since married women do not always behave as secondary workers. Stephens (2002) notes that given the transitory nature of unemployment, studies that do find evidence show only small magnitudes for this added worker effect.

the patterns of labour participation that might occur as a result of sporadic health episodes and unpredictable caregiving responsibilities that take place due to a disabling condition within the family unit. The examination of specific disabling conditions in the analysis untangles the opposing impacts of various conditions on labour force participation.

#### 4. METHODS

##### 4.1 Model

All family members of working age (20 to 64 years of age) who do not have a disability are included in a general model. Using probit analysis, estimates are obtained regarding the effect that a relative's disabling health condition has on the probability of labour force participation among healthy family members of working age. A comparison is made between family members who reside with a person afflicted with a disabling condition and those who do not. A person is considered to have a disabling condition if he or she reports a health condition and possesses a limitation (either profound, severe, moderate, or mild) or restriction<sup>2</sup> (either schooling or employment) that lasts at least six months and restricts everyday activities (Australian Bureau of Statistics, 2010).

The model uses labour force participation as the dependent variable and the explanatory variables defined in Table 1. Labour force participation studies often use probit analysis, controlling for variables that affect labour force behaviour (Berger & Fleisher, 1984; Carmichael & Charles, 1998; O'Hara, 2004; Roberts, 1999; Vecchio, 2007; Wolfe & Soldo, 1994).

Letting  $y_i = \begin{Bmatrix} 0 \\ 1 \end{Bmatrix}$  denote labour force participation of individual  $i$  the model becomes

$$P(y_i = 1: x_{i1} \dots x_{ik}) = \Phi \left( \beta_0 + \sum_{j=1}^k \beta_j x_{ij} \right) + e_i$$

where  $\Phi(\cdot)$  is the cumulative distribution function of the standard normal and parameter estimates  $\hat{\beta}_0 \dots \hat{\beta}_k$  are determined by Maximum Likelihood (ML). Variables  $x_1 \dots x_k$  contain information on socio-demographic characteristics, geography, family, and family conditions.

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<sup>2</sup> A person has a restriction if he or she has difficulty participating in life situations, needs assistance from another person, or uses an aid. (Australian Bureau of Statistics, 2009)

The dependent variable, labour force participation, represents those in the selected sample who are either in the labour force, that is, employed or actively seeking employment, or not in the labour force. A person is considered employed if he or she has worked in a job, business or farm during the reference week (the full week prior to the date of interview), or had a job in the reference week, but were not at work (Australian Bureau of Statistics, 2009).

The *socio-demographic* variables relating to the healthy family member are included in the model. In line with previous studies (Carmichael & Charles, 1998; Roberts, 1999; Wolfe & Soldo, 1994), the model includes age, age squared, and the squared value of the  $i^{th}$  person's age. Research indicates a quadratic relationship between age and labour force participation, so including age squared best captures the effects of age on labour force participation. Education is a categorical variable representing education of eleven years or less up to tertiary education. Health condition is a dichotomous variable that captures the possible work restriction of the healthy family member. This variable indicates whether the healthy family member has a long-term health condition without disability or no long-term health condition. The variables for male, marital status and country of birth are also included in the model. The inclusion of the indicator of whether the person is a caregiver is used in the model to disentangle the opposing effects of the need to provide care and the loss of income.

The *geographic* vector of categorical variables representing Australian states and cities capture differences in work conditions and employment opportunities by geographic area. Health outcomes and care arrangements relating to medical treatment can also vary according to distance from major cities (Australian Institute of Health and Welfare, 2012; Kogevinas & Porta, 1997; Tomatis, 1997).

The *family* vector represents family characteristics such as number of children under 15 and family size. Browning (1992) shows that the presence and number of children decreases the labour supply of mothers.

The *family conditions* vector includes the main disabling condition of a family member. Cancer is Australia's leading broad cause of disease burden (19% of total Disability-Adjusted Life Year), followed by cardiovascular disease (16%), mental disorders (13%) and chronic respiratory diseases (7%) (Australian Institute of Health and Welfare, 2010). This is followed by diabetes, injuries and musculoskeletal diseases (Australian Institute of Health and Welfare, 2010). Cancer is a dichotomous variable that takes a value of 1 if a person resides



with a family member afflicted with any cancer type<sup>3</sup> and 0 otherwise. Other disabling conditions including diabetes, cardiovascular<sup>4</sup>, mental<sup>5</sup>, respiratory<sup>6</sup>, musculoskeletal<sup>7</sup> and other are also included in the model. The reference category is residing with a family experiencing no disabling conditions. The disabling conditions are derived from the main conditions reported by the Australian Bureau of Statistics (ABS) (Australian Bureau of Statistics, 2010).

The characteristics of ill family members that are added to the model includes: number of conditions; has profound to moderate disability; residing in the city. The variable for disability is used to determine burden of care to family members. The greater the level of disability of an ill family member, the more care demands are placed on other family members (AIHW, 2011; Sherwood et al., 2008). The inclusion of the city variable is justified given that qualitative research indicates that families coping with chronic health conditions residing in rural or remote areas experience the added stress of distance from treatment centres (McGrath, 2001).

Data and statistical analysis are performed using the statistical package Stata. After fitting the models using a probit regression, the marginal effects at the multivariate point of means are computed (that is, the marginal effects for an average family member of working age).

#### *4.2 Data description*

The data for analysis were sourced from the Survey of Disability, Ageing and Carers 2009 (SDAC), Confidential Unit Record Files (Australian Bureau of Statistics, 2009). The primary objective of the survey was to collect information about three population groups: people with a disability; those aged 60 years and over; people who provide assistance to older people and people with disabilities. The database generated by the SDAC consists of 72,075 observations. For weighting purposes, the SDAC data are benchmarked to the estimated

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<sup>3</sup> Cancer types include: breast cancer, prostate cancer, other neoplasms (tumours/cancers), diseases of the blood and blood forming organs and certain disorders involving the immune system.

<sup>4</sup> Cardiovascular includes: heart disease, angina, myocardial infarction (heart attack), other heart diseases, hypertension (high blood pressure), stroke, other diseases of the circulatory system.

<sup>5</sup> Mental disorders include: mental and behavioural disorders n.f.d., schizophrenia, depression/mood affective disorders (excluding postnatal depression), phobic and anxiety disorders, nervous tension/stress, other mental and behavioural disorders.

<sup>6</sup> Respiratory diseases: bronchitis/bronchiolitis, respiratory allergies (excluding allergic asthma), emphysema, asthma, other diseases of the respiratory system

<sup>7</sup> Musculoskeletal includes: arthritis and related disorders, back problems (dorsopathies), repetitive strain injury/occupational overuse syndrome, other soft tissue/muscle disorders, (including rheumatism), osteoporosis, other diseases of the musculoskeletal system, and connective tissue, arm/hand/shoulder/leg/knee/foot/hip damage from injury or accident.

population as of 30 June 2009 - weighted count of 21,194,694 (Australian Bureau of Statistics, 2009). The survey conducted by the ABS throughout Australia, from April to December 2009, surveyed people in both urban and rural areas and in all states and territories. Every member of the selected households was included in the survey irrespective of disability status, age and carer status.

The analysis is confined to non-institutionalised individuals between 20 and 64 years in age, without a disability and residing with others. An individual becoming ill may have caused a change in labour participation for household members or may have led to that individual to join a household on the previous labour participation decisions of those members (for example, moving in with parents who are no longer working). To isolate this relationship the analysis excluded individuals who moved into a household because of their disability/illness or age. After excluding individuals who do not fit the study's criteria, 25,994 cases remain for analysis. The weight value indicates that 9,009,802 units are represented by the sample.

To construct family variables for each individual, the SDAC family level file was merged with the person level file. Stata syntax was used to construct a variety of family variables that identified individuals of working age belonging to a family where an individual experiences/does not experience a disabling condition.

## 5. RESULTS

The descriptive statistics for the sample of family members under investigation are stratified by labour force status (in the labour force or not in the labour force) and reported in Table 1. A greater proportion of those in the labour force tend to be male, younger, from an English speaking background, possess no long-term health condition, not a caregiver and reside with fewer children under 15.

Table 1: Variable definitions and weighted descriptive statistics – Family members of working age by labour force participation

		Labour Force		Not in Labour Force	
		Obs = 22205 Wght= 7715325		Obs = 3789 Wght= 1294477	
Variable	Definition	Mean/ %	SD	Mean/ %	SD
<i>Male</i>	1 if male; 0 female	53.38%	0.50	21.79%	0.41
<i>AGE<sup>a</sup></i>	Age in mean ranges divided by 100: (0.22 to 0.62)	39.77	0.12	42.48	0.14
<i>AGESQ</i>	Age Squared, ranges divided by 100: (0.05 to 0.38)	17.20	0.10	19.95	0.12
<i>COB</i>	1 if English speaking background; 0 otherwise	82.03%	0.38	71.92%	0.45
<i>Married</i>	1 if married; 0 otherwise	63.06%	0.48	67.13%	0.47
<i>Education</i>	<i>TERTY</i> : 1 if Post or Bachelor Graduate; 0 otherwise	28.45%	0.45	21.80%	0.41
	<i>DIP</i> : 1 if Diploma; 0 otherwise	10.80%	0.31	9.62%	0.29
	<i>CERT</i> : 1 if Certificate; 0 otherwise	22.06%	0.41	12.52%	0.33
	<i>ED12</i> : 1 if 12 years of schooling (referent); 0 otherwise	17.53%	0.38	20.20%	0.40
	<i>ED11U</i> : 1 if 11 or less years of schooling; 0 otherwise	21.16%	0.41	35.86%	0.48
<i>Health Condition</i>	1 if long-term health condition without disability; 0 otherwise	26.81%	0.44	31.75%	0.47
<i>Caregiver</i>	1 if a caregiver; 0 otherwise	10.94%	0.31	17.63%	0.38
<i>CITY</i>	1 if Major city; 0 otherwise	72.04%	0.45	71.29%	0.45
<i>STATE</i>	<i>NSW</i> : 1 if New South Wales (referent); 0 otherwise	32.81%	0.47	33.98%	0.47
	<i>VIC</i> : 1 if Victoria; 0 otherwise	25.11%	0.43	25.57%	0.44
	<i>QLD</i> : 1 if Queensland; 0 otherwise	19.99%	0.40	19.17%	0.39
	<i>SA</i> : 1 if South Australia; 0 otherwise	7.22%	0.26	6.96%	0.25
	<i>WA</i> : 1 if Western Australia; 0 otherwise	10.15%	0.30	9.95%	0.30
	<i>TAS</i> : 1 if Tasmania; 0 otherwise	2.06%	0.14	2.46%	0.15
	<i>NT</i> : 1 if Northern Territory; 0 otherwise	0.82%	0.09	0.59%	0.08
	<i>ACT</i> : 1 if Australian Capital Territory; 0 otherwise	1.84%	0.13	1.32%	0.11
<i>KIDSU15</i>	Number of children in family aged under 15: 0 to 5	0.68	0.97	0.89	1.12
<i>Family size</i>	Number of persons in family (2-6)	3.26	1.13	3.29	1.20
<i>Number condition</i>	Number of conditions of ill family member	0.37	1.03	0.57	1.33
<i>Disability</i>	1 if reside with ill person who has either profound to moderate disability; 0 otherwise	6.74%	0.25	11.41%	0.32
<i>Ill Family City</i>	1 if reside with ill family member in a major city; 0 otherwise	11.41%	0.32	13.90%	0.35
<i>Cancer</i>	1 if any Cancer in family; 0 otherwise	0.32%	0.06	0.29%	0.05
<i>Diabetes</i>	1 if Diabetes in family; 0 otherwise	0.24%	0.05	0.48%	0.07
<i>Cardiovascular</i>	1 if Cardiovascular in family; 0 otherwise	0.73%	0.09	1.55%	0.12
<i>Mental</i>	1 if Mental illness in family; 0 otherwise	1.74%	0.13	1.92%	0.14
<i>Respiratory</i>	1 if Respiratory in family; 0 otherwise	0.61%	0.08	0.91%	0.09
<i>Musculoskeletal</i>	1 if Musculoskeletal in family; 0 otherwise	5.91%	0.24	7.25%	0.26
<i>Other</i>	1 if other condition not specified above in family; 0 otherwise	6.51%	0.25	9.31%	0.29
<i>NoCondition</i>	1 if NO chronic condition in family; 0 otherwise	83.93%	0.37	78.29%	0.41

<sup>a</sup>SDAC (2003) records the age of the respondents in five-year class intervals from 20 to 65. A new continuous variable is created using the one mean for each class interval.

Source: Derived from the SDAC, 2009.

Summary statistics, presented in Table 2, show family members who do/do not reside with a person afflicted with a disabling condition. Family members of working age residing with individuals with a disabling condition tend to participate less in the labour market, are older,

come from an English-speaking background, are single, less educated, possess a health condition, are a caregiver, live outside the city and reside with fewer children under 15 compared to those belonging to families with no disabling conditions.

Table 2: Summary statistics: Family members of working age

		No Disabling condition in family Obs = 21725 Wght= 7488944		Disabling condition in family Obs = 4269 Wght= 1520858		Chi 2
Variable	Definition	Mean/%	SD	Mean/%	SD	
<i>LFP</i>	1 if labour force participant; 0 otherwise	86.47%	0.34	81.52%	0.39	72.56**
<i>Male</i>	1 if male; 0 female	49.10%	0.50	47.61%	0.50	3.23
<i>AGE</i>	Age in mean ranges divided by 100: (0.22 to 0.62)	0.40	0.12	0.42	0.13	215.15**
<i>COB</i>	1 if English speaking background; 0 otherwise	79.78%	0.40	84.49%	0.36	51.60**
<i>Married</i>	1 if married; 0 otherwise	64.50%	0.48	59.41%	0.49	40.89**
<i>Education</i>	<i>TERTY</i> : 1 if Post or Bachelor Graduate; 0 otherwise	28.87%	0.45	20.71%	0.41	121.88**
	<i>DIP</i> : 1 if Diploma; 0 otherwise	10.85%	0.31	9.54%	0.29	6.64*
	<i>CERT</i> : 1 if Certificate; 0 otherwise	20.53%	0.40	21.44%	0.41	1.82
	<i>ED12</i> : 1 if 12 years of schooling; 0 otherwise	17.85%	0.38	18.21%	0.39	0.32**
	<i>ED11U</i> : 1 if 11 or less years of schooling; 0 otherwise	21.89%	0.41	30.10%	0.46	137.71**
<i>Health Condition</i>	1 if long-term health condition without disability; 0 otherwise	26.28%	0.44	33.60%	0.47	97.79**
<i>Caregiver</i>	1 if a caregiver; 0 otherwise	5.21%	0.22	44.85%	0.50	5468.47**
<i>CITY</i>	1 if Major city; 0 otherwise	72.38%	0.45	69.72%	0.46	12.84**
<i>KIDSU15</i>	Number of children in family aged under 15: 0 to 5	0.72	0.98	0.68	1.04	108.93**
<i>Family size</i>	Number of persons in family (2-6)	3.23	1.13	3.43	1.18	136.43**

\* and \*\* indicate significance at the 5% and 10% levels, respectively

Source: Derived from the SDAC, 2009.

### 5.1 Regression

Table 3 presents the output of the model for the total sample and stratified by gender and age groups. The estimates for most of the control variables are statistically significant and have the expected signs. Estimates indicate that females are less likely to participate in the labour force relative to males. The positive estimate of *AGE* and the negative estimate of *AGESQ* indicate that the relationship between an individual's age and his or her probability of being in the labour force has an inverted U shape. A greater number of children under the age of 15 in the family reduce the probability of labour force participation. Individuals residing with a family member afflicted with a disabling cancer condition have a greater probability of participating in the labour force.

Table 3: Labour force participation by gender and by age group: Probit regression

Variable	Total	Male	Female	Age 20-49	Age 50-64
	(1)	(2)	(3)	(4)	(5)
<i>Male</i>	0.764***	(omitted)	(omitted)	0.805***	0.698***
<i>AGE</i>	17.614***	17.394***	17.021***	6.487***	29.748
<i>AGESQ</i>	-22.790***	-23.078***	-22.104***	-6.770**	-35.113**
<i>COB</i>	0.426***	0.502***	0.409***	0.499***	0.270***
<i>Education: TERTY</i>	0.243***	0.095	0.318***	0.240***	0.385***
<i>DIP</i>	0.211***	0.131	0.247***	0.278***	0.160*
<i>CERT</i>	0.278***	0.241***	0.286***	0.295***	0.295***
<i>ED11U</i>	-0.153***	-0.010	-0.205***	-0.171***	-0.093
<i>Health condition</i>	-0.041	-0.032	-0.055*	-0.001	-0.093**
<i>Married</i>	0.030	0.486***	-0.180***	0.105***	-0.040
<i>Caregiver</i>	-0.169***	-0.262***	-0.118**	-0.182***	-0.198***
<i>States: VIC</i>	0.005	0.008	0.006	0.036	-0.068
<i>QLD</i>	0.039	0.047	0.045	0.073*	-0.047
<i>SA</i>	0.056	-0.012	0.089*	0.075	-0.002
<i>WA</i>	0.016	0.049	-0.003	0.005	0.038
<i>TAS</i>	-0.092*	-0.221**	-0.045	-0.108*	-0.075
<i>NT</i>	0.175**	0.004	0.254***	0.191**	0.135
<i>ACT</i>	0.172***	0.039	0.251***	0.271***	-0.062
<i>CITY</i>	-0.059*	-0.049	-0.063*	-0.057	-0.044
<i>KIDSU15</i>	-0.343***	-0.103***	-0.454***	-0.299***	-0.182***
<i>Family size</i>	0.071***	0.068***	0.083***	0.032	0.027
<i>Numb conditions</i>	-0.065***	-0.021	-0.082***	-0.062**	-0.051*
<i>Disability</i>	-0.111*	-0.04	-0.179**	-0.144*	-0.064
<i>Ill family city</i>	0.173***	0.222**	0.159**	0.132	0.185*
<i>Cancer</i>	0.430**	0.545	0.435*	0.694*	0.247
<i>Diabetes</i>	-0.052	-0.08	-0.024	0.22	-0.366
<i>Cardiovascular</i>	-0.132	-0.319	-0.057	-0.139	-0.167
<i>Mental</i>	0.038	-0.327*	0.217	0.115	-0.096
<i>Respiratory</i>	-0.027	0.023	-0.074	-0.072	0.101
<i>Musculoskeletal</i>	0.062	-0.184	0.224**	0.177	-0.073
<i>Other</i>	-0.028	-0.225*	0.055	0.062	-0.170
<i>NoCondition</i>	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)
<i>_cons</i>	-2.588***	-2.102***	-2.281***	-0.833**	-5.140
<i>ll</i>	-3140897	-910827	-2141229	-2140867	-973662
<i>N</i>	25994	12435	13559	19083	6911
<i>r2_p</i>	0.153	0.131	0.118	0.144	0.166
<i>chi2</i>	2158.102	575.928	1303.99	1324.584	872.851

\*, \*\* and \*\*\* indicate significance at the 1%, 5% and 10% levels, respectively

Source: Derived from the SDAC, 2009

The stratification of the analysis by gender shows that males who are married are more likely to participate in the labour force than their counterparts. Males are less likely to participate in the labour force when residing with a relative who possesses a disabling mental condition. Referring to the sample of females, higher levels of education, single marital status and fewer children under 15 increases the probability of participation in the labour market. Residing with a family member with either a cancer or musculoskeletal condition also increases the chances of labour participation among females.

The stratification of analysis by age group indicates that those aged 20 to 49 years are more likely to participate in paid employment when residing with a family member experiencing a disabling cancer condition.

Table 4: Marginal effects: Total sample, gender and age group

Variable	Total Sample			Male			Female			Age 20-49			Age 50-64		
	Marg.E	Pvalue	Mean	Marg.E	Pvalue	Mean	Marg.E	Pvalue	Mean	Marg.E	Pvalue	Mean	Marg.E	Pvalue	Mean
<i>Male*</i>	0.141	0.000	0.488							0.131	0.000	0.483	0.171	0.000	0.505
<i>AGE</i>	3.254	0.000	0.402	1.616	0.000	0.403	4.660	0.000	0.400	1.054	0.000	0.346	7.254	0.124	0.562
<i>AGESQ</i>	-4.210	0.000	0.176	-2.143	0.000	0.178	-6.052	0.000	0.174	-1.100	0.010	0.127	-8.563	0.038	0.317
<i>COB*</i>	0.092	0.000	0.806	0.061	0.000	0.813	0.123	0.000	0.799	0.099	0.000	0.810	0.071	0.000	0.793
<i>Education: TERTY*</i>	0.042	0.000	0.275	0.008	0.128	0.259	0.082	0.000	0.290	0.036	0.000	0.286	0.085	0.000	0.242
<i>DIP*</i>	0.035	0.000	0.106	0.011	0.092	0.089	0.062	0.000	0.123	0.039	0.000	0.104	0.037	0.042	0.112
<i>CERT*</i>	0.046	0.000	0.207	0.020	0.000	0.273	0.071	0.000	0.144	0.043	0.000	0.208	0.066	0.000	0.204
<i>ED11U*</i>	-0.030	0.000	0.233	-0.001	0.875	0.204	-0.058	0.000	0.260	-0.030	0.000	0.198	-0.023	0.183	0.333
<i>Health Condition*</i>	-0.008	0.113	0.275	-0.003	0.504	0.271	-0.015	0.079	0.279	0.000	0.972	0.213	-0.023	0.022	0.455
<i>Married*</i>	0.006	0.282	0.636	0.051	0.000	0.636	-0.048	0.000	0.637	0.017	0.002	0.565	-0.010	0.472	0.842
<i>Caregiver*</i>	-0.034	0.000	0.119	-0.029	0.001	0.099	-0.033	0.016	0.139	-0.033	0.002	0.098	-0.051	0.001	0.180
<i>States: VIC*</i>	0.001	0.883	0.252	0.001	0.887	0.252	0.002	0.879	0.251	0.006	0.343	0.253	-0.017	0.233	0.249
<i>QLD*</i>	0.007	0.242	0.199	0.004	0.45	0.197	0.012	0.27	0.201	0.012	0.066	0.199	-0.012	0.446	0.198
<i>SA*</i>	0.010	0.136	0.072	-0.001	0.862	0.071	0.024	0.05	0.073	0.012	0.100	0.071	0.000	0.978	0.075
<i>WA*</i>	0.003	0.666	0.101	0.004	0.474	0.103	-0.001	0.955	0.100	0.001	0.906	0.101	0.009	0.572	0.101
<i>TAS*</i>	-0.018	0.085	0.021	-0.024	0.04	0.021	-0.013	0.472	0.022	-0.019	0.107	0.020	-0.019	0.415	0.024
<i>NT*</i>	0.029	0.008	0.008	0.000	0.974	0.008	0.062	0.001	0.008	0.027	0.015	0.008	0.031	0.271	0.007
<i>ACT*</i>	0.029	0.000	0.018	0.003	0.662	0.018	0.061	0.000	0.017	0.037	0.000	0.018	-0.016	0.498	0.017
<i>CITY*</i>	-0.011	0.048	0.719	-0.005	0.392	0.723	-0.017	0.087	0.716	-0.009	0.124	0.734	-0.011	0.411	0.678
<i>KIDSU15</i>	-0.063	0.000	0.713	-0.010	0.002	0.687	-0.124	0.000	0.738	-0.049	0.000	0.910	-0.044	0.000	0.147
<i>Family size</i>	0.013	0.000	3.262	0.006	0.008	3.292	0.023	0.000	3.234	0.005	0.106	3.425	0.007	0.343	2.792
<i>Number conditions</i>	-0.012	0.000	0.400	-0.002	0.523	0.390	-0.023	0.000	0.410	-0.010	0.019	0.341	-0.012	0.075	0.570
<i>Disability*</i>	-0.022	0.066	0.074	-0.004	0.681	0.073	-0.052	0.017	0.075	-0.025	0.077	0.068	-0.016	0.496	0.092
<i>Ill family city*</i>	0.029	0.002	0.118	0.018	0.018	0.118	0.041	0.027	0.117	0.020	0.087	0.111	0.042	0.047	0.136
<i>Cancer*</i>	0.060	0.002	0.003	0.032	0.018	0.003	0.097	0.017	0.003	0.069	0.000	0.002	0.053	0.240	0.006
<i>Diabetes*</i>	-0.010	0.805	0.003	-0.008	0.857	0.002	-0.007	0.924	0.003	0.031	0.390	0.002	-0.105	0.304	0.004
<i>Cardiovascular*</i>	-0.026	0.378	0.008	-0.038	0.361	0.006	-0.016	0.727	0.011	-0.025	0.536	0.007	-0.044	0.404	0.014
<i>Mental*</i>	0.007	0.72	0.018	-0.040	0.142	0.018	0.054	0.068	0.017	0.017	0.373	0.017	-0.024	0.620	0.019
<i>Respiratory*</i>	-0.005	0.856	0.007	0.002	0.933	0.007	-0.021	0.687	0.007	-0.012	0.687	0.006	0.023	0.699	0.008
<i>Musculoskeletal*</i>	0.011	0.423	0.061	-0.020	0.225	0.061	0.056	0.014	0.061	0.026	0.077	0.052	-0.018	0.560	0.088
<i>Other*</i>	-0.005	0.706	0.069	-0.025	0.123	0.067	0.015	0.525	0.071	0.010	0.491	0.069	-0.044	0.204	0.069

\* indicates marginal effect is for discrete change of dummy variable from 0 to 1.

Source: Derived from the SDAC, 2009

## 5.2 Marginal effects

Table 4 presents the marginal effects and mean values based on the regressions presented in the previous subsection. For the categorical variables, the effects of discrete changes are computed, that is, the marginal effects for disabling condition variables show how labour participation is predicted to change as family health condition changes from 0 to 1, holding all other variables equal.

The marginal effects for an average family member of working age show that they have a 6% higher probability of participating in the labour force when residing with an individual afflicted with a disabling cancer condition, than for those residing with a family with no disabling condition. Among the sample of males and females the probability of labour participation is 3.2% and 9.7%, respectively. The average female family member also has a 5.4% and 5.6%, respectively, higher probability of participating in the workforce when residing with an individual afflicted with either a mental condition or musculoskeletal condition. Healthy family members between 20 and 49 years in age have a 6.9% and 2.6%, respectively, higher probability of labour force participation when residing with a person afflicted with a disabling cancer or musculoskeletal condition.

## 6. DISCUSSION

This study examined the association between labour market participation and residing with an individual diagnosed with a disabling condition. The major finding of this study is the greater probability of labour force participation observed among family members of individuals afflicted with a disabling cancer condition. Family members of individuals with musculoskeletal conditions also associate with an increase in labour participation. Mental illness decreases the probability of labour market participation of male family members.

Relative to other health conditions, the burden of cancer illnesses can be substantial (Australian Institute of Health and Welfare, 2012). The life threatening nature of diagnosis often requires intensive and long-term treatments that promote a dramatic change in lifestyle and a drain on a family's financial resources. This financial vulnerability provides an incentive for healthy family members to participate in the labour market. Research by Clavarino, Lowe, Carmont, and Balanda (2002) finds evidence of financial distress for 50% of Queensland cancer families studied. The loss of employment by the cancer patient adversely affects the family's finances (Clavarino et al., 2002; McGrath, 2001; McGrath &



Seguerra, 2000; Mols, Thong, Vissers, Nijsten, & van de Poll-Franse, 2012). When patients do return to paid employment, they tend to work fewer hours (Cheung et al., 2009; Kessler, Greenberg, Mickelson, Meneades, & Wang, 2001; Mols et al., 2012), highlighting the importance of long-term employment by other family members. Problems with obtaining health insurance, life insurance and home loans are also reported as common among families experiencing chronic illnesses (Mols et al., 2012). Studies have also documented the long-term financial difficulties associated with the reliance on government benefits by families experiencing cancer illnesses. Such benefits do not provide adequate coverage for a medical crisis and tend to erode savings, insurance pay outs and superannuation (McGrath, 2001; McGrath & Seguerra, 2000). In families where one member is able to keep part-time work, this acts as a buffer against the subsistence living associated with security benefits (McGrath, Holewa, & McNaught, 2010). Thus the employment of the spouse of the patient is a significant factor contributing to the economic viability of families of cancer patients.

In addition to financial constraints, two other factors may explain the positive impact of an individual's disabling condition on the labour supply of healthy family members. First, this study confined the analysis to persons of working age living with others. Single-person households were excluded from the analysis. Second, an individual was considered to belong to a family with a disabling condition if they resided with an ill person. Those not residing with an ill relative were not categorised as belonging to a family with a disabling condition. Using panel data and controlling for the potential endogeneity of the living arrangements, Leger (2000) found that caregiving and cohabiting with a sick, elderly parent appeared to have smaller negative effects on labour supply than past literature suggests.

The results also reveal a positive and significant relationship between labour participation and families afflicted with a disabling condition residing in the city. It is possible that family members are less likely to participate in the labour market when residing outside major cities because of extra burdens placed on healthy family members in terms of travel and care arrangements. It may be more difficult to combine these extra burdens and stay employed compared to their city counterparts. McGrath and Seguerra (2000) find that employment issues are difficult for rural families as there are significant problems with trying to run a business when away for treatment, as well as the financial strain of lost income when time must be taken off work to travel for treatment.

The stratification of the analysis by gender shows responsiveness by the sample of females to the presence of a family member afflicted with either a cancer or musculoskeletal

condition. Possibly women devote more time to care giving with a reduction in leisure time and an increase in labour market time. This increase in care giving and labour market time is likely given the more flexible work arrangements within female dominated sectors. Over 60% of part-time workers in Australia are female (Abhayaratna, Andrews, Nuch, & Podbury, 2008). The dominance of women in the part-time workforce provides opportunities for women to better adapt to changing circumstances and the health conditions of family members. Since the majority of employed males tend to possess relatively less flexible work arrangements, they may be more inclined to leave the workforce altogether when caregiving demands increase. An investigation of informal eldercare by employed individuals in Austria (Schneider, Trukeschitz, NMuhlmann, & Ponocny, 2012) finds that flexible work arrangements facilitate the attachment of female workers to their jobs and the labour market. The intensity of personal care provided to an older relative is significantly positively related to male workers' relative risk of labour market exit. In contrast, caring for ill family members made female workers less likely to exit the labour market (Schneider et al., 2012).

Among the sample of males, those residing with a person with a disabling mental illness were less likely to participate in the labour market. This finding may reflect the greater need for caregiving resources within these families. Studies have shown that caring for a relative with a mental illness is burdensome and demanding (Donaldson & Burns, 1999; Holmes & Deb, 1998; Williams & Doessel, 2001). If an ill family member needs care, this can be provided either directly by family members or indirectly by purchases made in the market place. The choice will partly depend on the availability and cost of care. Institutions such as care and treatment facilities can influence family labour supply (Saczuk, 2013). Their development, ease of access and low cost makes combining caregiving and market activity simpler and therefore facilitates labour force participation.

Investigations have drawn attention to resource inadequacies in the wider community for people with mental health conditions (Groom, Hickie, & Devenport, 2003; Mental Health Council of Australia, 2000; Palmer, 2005). The perception of inadequate service assistance and unmet care needs of informal caregivers is greater among those caring for relatives with mental disabilities compared to those caring for relatives with physical disabilities (Vecchio, Cybinski, & Stevens, 2009; Vecchio, Stevens, & Cybinski, 2008). Individuals with a mental disability require a different set of services to allow them to participate in the community and conduct their activities of daily living (Williams & Doessel, 2001). While physically ill people can require nursing services, they are usually capable of judgment and decision

making. Those suffering from a mental illness, however, often rely on their informal carers to make decisions and judgments. The duties of these informal carers can involve behavioural management issues, and time devoted to the activities of daily living and liaising with the legal and criminal justice systems (Lefley, 1996).

### *6.1 Limitations of the study*

Although the national data set provides a representative sample of the Australian population much of the information relating to health conditions is aggregated into general categories. These categories ignore differences in diagnostic groups relating to disease trajectories and outcomes which may in turn influence family resources and employment decisions. Information relating to the time when the labour market decisions are made in relation to the diagnosis would also have been beneficial, since each stage of an illness has very different implications (for example intensive period of treatment, remission, relapse or palliative care). Other information not captured in the data set, but which would have been useful, include the intensity of the treatment regime, whether an individual needed to relocate for treatment and the length of treatment<sup>8</sup>. To some extent, however, the inclusion of the disability variable in the model does control for the various stages of conditions. Due to data limitations, this study is unable to investigate changes in actual hours worked by healthy family members or identify the primary income earner. This would have provided greater insight into the indirect cost of illness.

## 7. CONCLUSIONS

The increased probability of labour force participation among healthy family members residing with an individual afflicted with a disabling cancer condition appears to be undertaken to insulate the family from financial hardship. There is evidence that females have greater capacity to participate in the labour market when a family member is unwell, possibly reflecting flexible work arrangements. Swanberg (2006) identifies a number of workplace factors that can improve the ability of informal caregivers to provide care and meet their paid employment obligations. These factors include schedule flexibility, social support networks

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<sup>8</sup> Currently there are no registered national data on the stage (severity) of cancer at diagnosis, the treatments applied to cancers or the frequency of cancer recurrence after treatment (Australian Institute of Health and Welfare, 2012). However, there are comprehensive national data on treatments provided through admitted patient hospitalisations for surgery and non-surgical care. Unfortunately, collecting data on stage, treatment and recurrence of cancer is difficult and expensive (Australian Institute of Health and Welfare, 2012).

at work, personal leave time, responsive supervisors and coworkers. Other employee benefits such as family medical leave and family health insurance are also helpful. Overall, employed informal caregivers place a higher priority on providing care than on work Swanberg (2006). Work, however, plays an important role in their lives by providing economic security and respite from the intensity of caring for someone ill.

Jacobs, Lilly, Ng, and Coyte (2013) found that the biggest cost driver of unpaid caregiving by Canadians appeared to be the higher likelihood of intense caregivers dropping out of the labour force. They conclude that government policies that enable caregivers to balance caregiving with employment may help to mitigate these losses. An ageing Australian population plus the continued trend towards shorter hospital stays and longer duration of care and treatment within private homes is expected to increase demand for informal care and financial support by family. Policy makers need to aggressively challenge current workforce programs to encourage employers to provide more flexible work arrangements. Workforce programs that allow family members opportunities to provide adequate caregiving and financial support to ill relatives are fundamental to the sustainability of health care programs.

#### ACKNOWLEDGEMENTS

We take this opportunity to thank Dr. Nicholas Rohde for his helpful comments and suggestions.

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