



# Chronic Illness and Mental Strain: The Moderating Role of Marital Status over the Disease Cycle

Jack Lam  
Institute for Social Science Research, The University of Queensland

Francisco Perales  
Institute for Social Science Research, The University of Queensland

*A more recent version of this paper was published as Lam J and Perales F. (2018) Chronic Illness and Mental Strain: The Longitudinal Role of Partners with Time Since Illness Onset. Longitudinal and Life Course Studies, 9(3), 279-298*

No. 2017-03  
January 2017



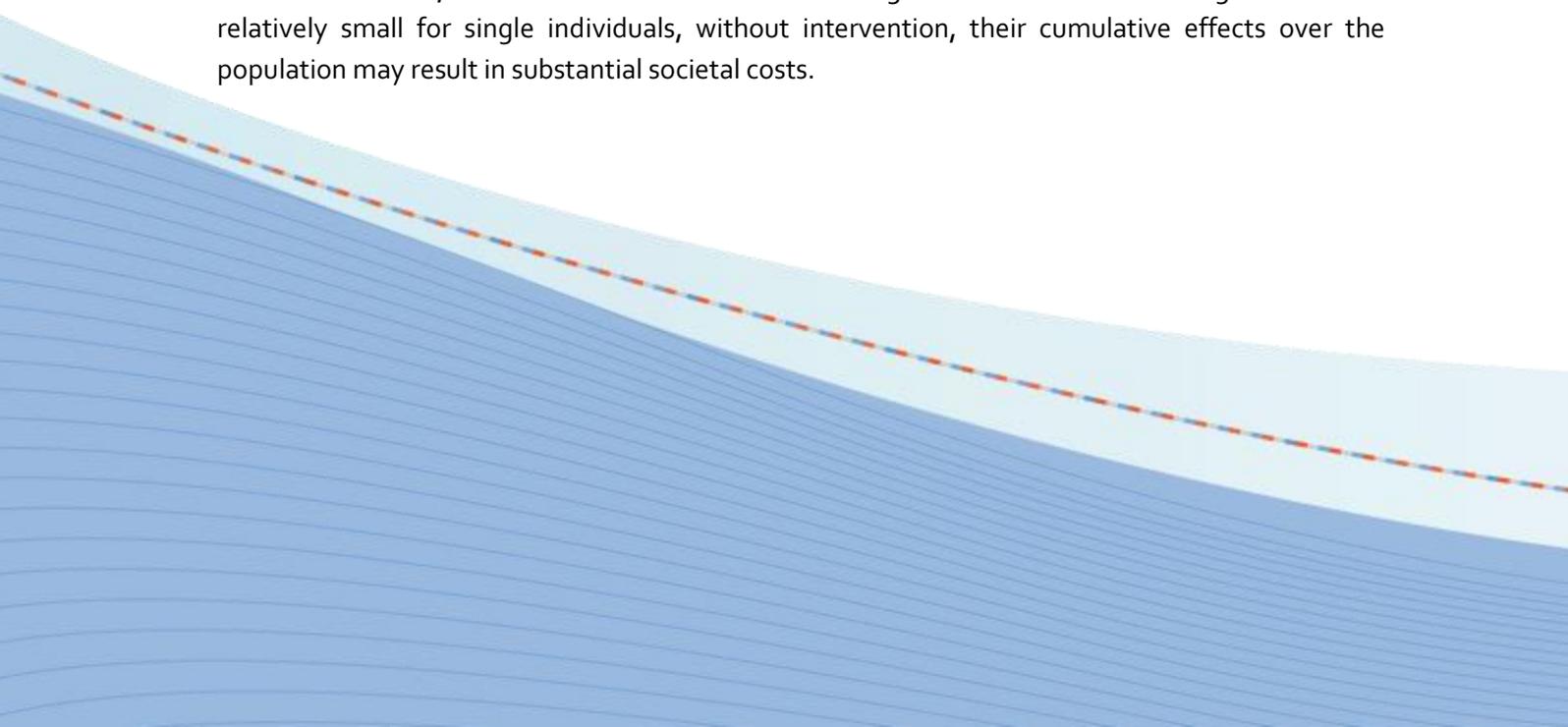
## NON-TECHNICAL SUMMARY

A consequence of an ageing population is that many people will eventually be diagnosed with a chronic condition. These conditions are associated with large monetary and social costs to individuals and their families over prolonged periods of time, and constitute a sizeable burden to the health care system. Compared to acute illnesses, chronic conditions are slow in their progression and often result in the emergence of new or increasingly pronounced functional limitations to which individuals must adjust. Undertaking large, recurrent and long-lasting life adjustments is a mentally straining process, and can have detrimental impacts on individuals' mental wellbeing. Consistent with this, international research documents links between the experience of chronic conditions and poor mental health.

Given the socio-economic costs of poor mental health and the increasing prevalence of chronic conditions, we must improve our understanding of the factors that buffer the stress associated with living with chronic illness. Here, we consider the potential protective effect of partnerships. Partners can be an important source of support for individuals living with a chronic disease. They can provide both intangible types of support (e.g. emotional availability, aid managing medication use...) and more tangible ones (e.g. financial support to cover medication costs, help with housework...). Individuals with chronic conditions receiving either kind of support may make more successful life adjustments following the onset of chronic illness, and suffer less psychological strain as a result. However, the role of a spouse as a support source may change over time, e.g. if marital quality decreases with declines in spousal health, spouses who act as caregivers experience burnout, or individuals adjust to living with a health condition through self-care.

We test these premises using recent longitudinal survey data for Australia. We find that for both men and women chronic conditions are associated with poorer mental health and marriage is associated with a health premium relative to singlehood, divorce, separation and widowhood. Critically, the effects of having a chronic condition on mental health are smaller when individuals are married compared to unpartnered or in *de facto* relationships. There were however no differences when individuals were in *de facto* relationships and when individuals were unpartnered. We also find that this protective effect of marriage changes over time and in gendered ways.

We conclude that, while the observed mental health gains associated with being married are relatively small for single individuals, without intervention, their cumulative effects over the population may result in substantial societal costs.



## ABOUT THE AUTHORS

**Jack Lam** is a Post-doctoral Research Fellow at the Life Course Centre and the Institute for Social Science Research, at The University of Queensland. His research examines issues of work, family and health over life course. He is also interested in understanding how these issues intersect with population ageing, with implications for retirement, chronic conditions, and intergenerational relationships and support. Email: [j.lam@uq.edu.au](mailto:j.lam@uq.edu.au)

**Francisco Perales** is Senior Research Fellow in Family Dynamics in the Institute for Social Science Research at The University of Queensland. His recent work has been on social disadvantage, gender inequalities, life course transitions, subjective wellbeing, and the use of household panel surveys within sociology. His recent research has been published in outlets such as *Journal of Marriage and Family*, *Social Forces*, *Social Science Research*, and *European Sociological Review*. Email: [f.perales@uq.edu.au](mailto:f.perales@uq.edu.au)

**ACKNOWLEDGEMENTS:** This research was supported by the Australian Research Council Centre of Excellence for Children and Families over the Life Course (project number CE140100027). The views expressed herein are those of the authors and are not necessarily those of the Australian Research Council. This paper uses unit record data from the HILDA Survey. The HILDA Project was initiated and is funded by the Australian Government Department of Social Services (DSS) and is managed by the Melbourne Institute of Applied Economic and Social Research (Melbourne Institute). The findings and views reported in this paper, however, are those of the author and should not be attributed to either DSS or the Melbourne Institute.

**DISCLAIMER:** The content of this Working Paper does not necessarily reflect the views and opinions of the Life Course Centre. Responsibility for any information and views expressed in this Working Paper lies entirely with the author(s).



(ARC Centre of Excellence for Children and Families over the Life Course)  
Institute for Social Science Research, The University of Queensland (administration node)  
UQ Long Pocket Precinct, Indooroopilly, Qld 4068, Telephone: +61 7 334 67477  
Email: [lcc@uq.edu.au](mailto:lcc@uq.edu.au), Web: [www.lifecoursecentre.org.au](http://www.lifecoursecentre.org.au)

## **Abstract**

Chronic conditions are associated with large personal, familial and social costs, and have deleterious effects on individuals' mental health. Drawing on stress process and life-course theories, we theorise and test whether marital status moderates the relationships between chronic illness and mental health, paying attention to longitudinal dynamics over the disease cycle. Our empirical analyses rely on nationally representative, panel data for Australia (n~95,000 observations), and fixed-effects regression models. We find that being partnered is associated with less negative consequences of having a chronic condition on mental health, with protective effects being larger amongst individuals in marriages than *de facto* relationships. There is also evidence of overtime changes in the protective effects of being partnered or married over the disease cycle. While the observed mental health gains associated with being married are relatively small for single individuals, without intervention, their cumulative effects over the population may result in substantial societal costs.

**Keywords:** mental health; chronic conditions; disease onset; gender; marital status; Australia; panel data

## INTRODUCTION

A consequence of an ageing population is that many people will eventually be diagnosed with a chronic illness. For example, 86% of people aged 65 years and older in the US and 78% of people in the same age group in Australia have at least one chronic condition (AIHW 2014; Ward, Schiller, and Goodman 2014). Chronic conditions are associated with large monetary and social costs to individuals and their families over prolonged periods of time, and constitute a sizeable burden to the health care system (AIHW 2014). Compared to acute illnesses, chronic conditions are slow in their progression and often result in the emergence of new or increasingly pronounced functional limitations to which individuals must adjust (Dunlop et al. 2004). Undertaking large, recurrent and long-lasting life adjustments is a mentally straining process, and can have detrimental impacts on individuals' mental wellbeing (Holahan, Holahan, and Belk 1984; Serido, Almeida, and Wethington 2004).

Consistent with this, a breadth of international research has documented robust links between the experience of chronic conditions and poor mental health (Hollingshaus and Utz 2013; Polsky et al. 2005; Pudrovska 2010). Given the large social and economic costs of poor mental health and the increasing prevalence of chronic conditions, it is important that we improve our understanding of factors that may *buffer* the stress associated with living with chronic illness. Previous research has made some inroads in this regard, providing evidence that age (Schnittker 2005), gender (Pudrovska 2010) and social support and networks (Schafer and Koltai 2015) are important moderators of the relationship between chronic conditions and mental health. We add to this body of knowledge by focusing on the potential moderating effect of marital status.

Marital status is an important component of individuals' identity and socio-structural position (Coombs 1991). Critical to our argument, being in an intimate relationship and the type of such relationship have been found to modify the severity of the detrimental consequences that negative life events and transitions can have on individuals' mental wellbeing. For example, the negative impacts of unemployment and job loss are felt less strongly by married/partnered individuals (Kasl and Jones 2000). Generally, the protective effects associated with being partnered are attributed to the emotional and financial support provided by one's partner, as well as health-related social control (August and Sorokin 2010; Rendall et al. 2011) and social integration and attachment (Umberson 1987). Further, an additional buffer provided by marriage relative to *de facto* relationships (the 'marriage protection effect') has been reported. This may be attributed to lower relationship commitment, satisfaction and expectations amongst individuals in *de facto* relationships compared to their married counterparts (Wiik,

Bernhardt, and Noack 2009; Wiik, Keizer, and Lappegård 2012), which may result in a comparative advantage amongst married individuals in eliciting care and support from their partners (Noël-Miller 2011).

Based on this previous literature, we expect marital status to act as a moderator of the relationship between chronic conditions and mental health. We base our arguments on principles from stress process theory, an overarching analytical framework with multiple conceptual components (Pearlin et al. 1981; Pearlin 1989). A key element in this framework is the notion of ‘stressors’, defined as the “*broad array of problematic conditions and experiences that can challenge the adaptive capacities of people*” (Pearlin 2010: 208). Stressors can take the form of disruptive events or of persistent hardships (Pearlin 2010). In our application, the onset and experience of a chronic condition can be considered an important stressor, as they have the potential to pose challenges to people’s agency by constraining their functional capabilities. However, as highlighted by stress process theory, individuals who are exposed to similar stressors do not always suffer the same negative health effects (Pearlin 2010). This is because different individuals dispose of different resources that can act as protective barriers.

In our application, a partner would be an important protective resource, providing support to help individuals cope with the stress emerging from the functional limitations associated with chronic diseases (Pearlin 1989; Pearlin et al. 1981). Spouses and partners may also provide economic support to confront the often-substantial financial costs associated with living with a chronic illness (Essue et al. 2011).

We combine these insights emerging from stress process theory with principles of the life-course approach, particularly its emphasis on how individuals’ outcomes evolve with time elapsed after life transitions (Pearlin 2010). We do so by considering how the relationships between chronic conditions, mental health and marital status play out in a longitudinal context. We parse out the experience of chronic illness as event strain and chronic strain by contrasting individual outcomes at disease onset and at subsequent stages of the disease cycle (Avison and Turner 1988). While illness onset could be considered a discrete life event, prolonged exposure to a chronic disease may result in the disease being internalised as a new social role for those affected by it (Mechanic and Volkart 1961; Perry 2011). This distinction has important implications, as it allows the identification of overtime changes in individual vulnerabilities.

The role of spouses and partners as sources of support may also change over time, as caregivers experience burnout or become unwilling or unable to provide support. At the same time,

individuals may increasingly turn to other sources of paid or unpaid help, or learn better ways to manage their conditions. Therefore, the presence or absence of a partner or spouse may be more or less important for men and women living with a chronic illness over time. Thus, we consider whether and how the mental health effects of living with a chronic condition (and any moderation of such effects by marital status) differ across stages of the disease cycle.

We test these premises using nationally representative, panel data from the Household Income and Labour Dynamics in Australia (HILDA) Survey, and fixed-effect panel regression models.

## **THEORETICAL BACKGROUND**

There is now a robust body of longitudinal evidence documenting that, after the diagnosis of a chronic condition, individuals tend to report elevated levels of depressive symptoms (Hollingshaus and Utz 2013; Polsky et al. 2005; Pudrovska 2010) and anxiety disorders (Clarke and Currie 2009). This is important, as mental health is a crucial factor promoting adherence to medical recommendations amongst individuals with a health condition and has implications for disease management, recovery and mortality (DiMatteo, Lepper, and Croghan 2000; Carney, Freeland, Miller, and Jaffe 2002). The mental strain associated with living with a health condition has been found to differ across individuals with different socio-demographic traits. For example, the negative impact of having a health condition on mental health is comparatively stronger amongst men (Hollingshaus and Utz 2012), non-Hispanic whites (Hollingshaus and Utz 2012), and people with larger social networks (Schafer and Koltai 2015).

We draw on stress process theory (Pearlin et al. 1981; Pearlin 1989) and an associated body of evidence linking individuals' social relations to their health outcomes (Berkman and Glass 2000; Cohen 2004). These highlight how sources of social support can be important resources protecting individuals from the detrimental health effects of social stressors. In the case of chronic illness, partners can be considered one important source of support, with the potential to buffer the negative mental health effects of stressors associated with chronic diseases. Spouses and partners are amongst the most important relationships in adults' lives, and are one of the key sources of social support amongst partnered people (House, Landis, and Umberson 1988). Spouses could provide different types of support to partners with chronic conditions that may alleviate the negative effects of their conditions on their mental health. On the one hand, partners can provide *intangible* types of support, such as emotional availability, being present when important information about the disease is passed on, backing up important decisions,

e.g. about treatment or employment participation, aid managing medication use, or gathering information about how to best address functional limitations associated with the disease. On the other hand, partners can also provide more *tangible* types of support to meet the needs associated with the disease. This includes financial support to cover medication costs, help confronting reductions in labour income due to the illness, physical help to overcome functional limitations, e.g. help walking, carrying things, or performing routine household tasks and housework. Individuals with chronic conditions receiving either kind of support may feel that they have the resources necessary to make successful life adjustments following the onset of chronic illness, and suffer less psychological strain as a result (Berkman and Glass 2000; Cohen and Wills 1985; Helgeson and Cohen 1996; Stanton, Revenson, and Tennen 2007).

At the same time, there are documented differences in caregiving between married individuals and individuals in *de facto* relationships. For instance, cohabiters are less likely than married individuals to receive care from their partner (Noël-Miller 2011). It is possible that the institution of marriage elicits greater expectations of and willingness to provide caregiving that may not exist outside marital unions, but also that individuals who hold such views select into marriage. Further, it is also possible that married individuals perceive greater support than individuals in *de facto* relationships due to their higher levels of relationship satisfaction (Wiik et al. 2009; Wiik et al. 2012). Based on these premises, we hypothesise that:

*Hypothesis 1: The negative impacts of living with a chronic condition will be felt less severely by individuals in a partnership compared to individuals not in a partnership.*

*Hypothesis 2: The negative impacts of living with a chronic condition will be felt less severely by individuals when married than when in de facto relationships.*

The life-course approach emphasises how the experience of life events and transitions not only has concurrent effects on individuals, but can also set onward trends in their behaviours and outcomes (Pearlin, 2010). In this vein, the association between chronic illness and mental health may change over the disease cycle, as individuals adjust to living with a health condition (De Ridder et al. 2008; Kristofferzon, Lofmark, and Carlsson 2003; Polsky et al. 2005). The time around the initial diagnosis has been documented to be particularly stressful for several reasons. First, it is an event that may disrupt an individual's sense of self and personal identity (Bury

1982). Second, it exposes individuals to discourses about being diagnosed with a health condition which may affect their emotions. For example, being diagnosed with cancer exposes patients to inquiries about what they had done to become sick or whether they would adequately manage their disease (Willig 2011). Third, the initial changes in everyday life individuals must undertake to adapt and manage their newly acquired or diagnosed conditions are more numerous and costly (Newman, Steed, and Mulligan 2004).

Beyond the initial diagnosis, living with a chronic disease could continue to be stressful or even become more stressful; many chronic diseases require continual adjustments in multiple life domains, while others are increasingly degenerative (De Ridder et al. 2008). As a result, the impact of chronic conditions on mental strain may change over time. However, the limited body of evidence on this portrays mixed findings. For example, drawing on eight years of panel data from the US Health and Retirement Survey, Polsky et al. (2005) found that depressive symptoms since the diagnosis of a chronic condition generally decreased over time. However, van't Spijker, Trijsburg and Duivenvoorden (1997) found that for cancer survivors there was a progressive decrease in anxiety—although not of depression.

The role of a spouse as a support source for people who live with a chronic condition may also change over time (Noël-Miller 2010). First, there is evidence that marital quality decreases with declines in spousal health (Booth and Johnson 1994), and such changes may have implications for the willingness and ability of spouses to provide care. Second, spouses who act as caregivers over a prolonged spell of time may experience stress and burnout themselves as a result (Adelman et al. 2014; Pitceathly and Maguire 2003), which would also make them less likely to continue providing care, the same amount of care, or care of the same quality. Third, unpartnered individuals may adjust to living with a health condition through self-care, as well as drawing on friends and family for support, rendering the presence of a spouse less salient over time. In line with these propositions, we hypothesise that:

*Hypothesis 3: The protective effect of being partnered on the mental health of individuals living with a health condition will erode over time.*

It is more difficult to make predictions about the longitudinal outcomes of married individuals vis-a-vis individuals in *de facto* relationships. On the one hand and to the extent that marriage symbolises long-term commitment to a relationship, married people may do better that

individuals in *de facto* relationships in the years following a disease diagnosis. On the other, individuals in *de facto* relationships draw their social support from more diverse networks, which would protect them from any carer burnout experienced by their partners (Fiori, Smith, and Antonucci 2007). The latter suggests that the hypothesised advantages enjoyed by individuals in marriages relative to *de facto* relationships may decline over the course of a disease cycle.

## **DATA**

To examine the longitudinal associations between chronic conditions, marital status and mental health we leverage panel data from the Household Income and Labour Dynamics in Australia (HILDA) Survey comprising the period 2001-2014. The HILDA Survey is representative of the Australian population in 2001, and has since then collected annual data on a range of topics from individuals age 15 and over living in the same households. The study features a complex, multi-stage sampling strategy, and its data collection is implemented using a mixture of self-complete questionnaires and computer-assisted face-to-face interviews (Summerfield et al. 2014). The HILDA Survey has sample sizes ranging from 12,408 to 17,612 across its waves, and remarkably low attrition rates for international standards. For example, the attrition rate in its latest wave (Wave 14) was *circa* 4%. (Summerfield et al. 2014).

The HILDA Survey is a unique dataset to test our research hypotheses because: (i) it contains repeated measurements of the mental health, chronic conditions, and marital status of the same individuals, which enables us to examine their longitudinal associations; (ii) it tracks individuals annually and over a prolonged observation window (14 years), which permits us to observe transitions across stages of the disease cycle; (iii) it contains information from a large sample of individuals, which provides adequate statistical power; and (iv) it is nationally representative at baseline, which makes our results likely generalizable to the Australian population.

Our analytic sample includes all observations without missing data on model variables. Of 200,311 observations in the HILDA Survey, 22,255 (or 11%) have missing data on model variables. Of these, 22,059 (or 99%) lack information on mental health, as this is asked within a self-complete questionnaire which incurs higher non-response than the face-to-face instrument. The means of model variables in the full and final analytic sample are very similar, suggesting that our results are not biased due to missing data. Our final sample comprises

178,056 observations (94,758 for women and 83,298 for men) from 27,174 individuals (14,086 women and 13,090 men).

Our outcome of interests is respondents' mental health. To operationalize this, we use the Mental Health Inventory (MHI-5) subscale of the Medical Outcomes Questionnaire Short-Form Health Survey (SF-36) (Ware & Sherbourne 1992). The MHI-5 is a validated measure that is routinely used in the survey literature to capture overall mental health levels. It is an additive scale constructed by combining responses to five questions, which collectively tap the four major mental health dimensions –anxiety, depression, loss of emotional/behavioural control, and psychological wellbeing (Ware & Sherbourne 1992). Questions ask how often in the past four weeks the respondent had (i) *“been a nervous person”*, (ii) *“felt so down in the dumps that nothing could cheer them up”*, (iii) *“felt calm and peaceful”*, (iv) *“felt down”* and (v) *“been a happy person”*. Possible responses are: (i) *“all of the time”*, (ii) *“most of the time”*, (iii) *“a good bit of the time”*, (iv) *“some of the time”*, (v) *“a little of the time”* and (vi) *“none of the time”*. As is typical in the literature, the resulting additive scale is then transformed so that it ranges from 0 (worst possible outcome) to 100 (best possible outcome). In the HILDA Survey, the MHI-5 questions are collected via a self-complete questionnaire, as to ensure that respondents' answers are not biased by the presence of an interviewer (e.g. through social desirability bias). In our sample, the average score in the MHI-5 is 74.2 (SD=17.1), 73.1 amongst women (SD=17.5) and 75.4 amongst men (SD=16.7).

The HILDA Survey includes information, updated annually, on whether respondents have a chronic condition. Specifically, as part of the face-to-face interview, HILDA Survey participants are asked the following yes/no question: *“Do you have any long-term health condition, impairment or disability (such as these) that restricts you in your everyday activities, and has lasted or is likely to last, for 6 months or more, and cannot be corrected by medication or medical aids?”*. Respondents are then presented with a showcard containing a list of 15 conditions, which are used as prompts. However, the question wording does not limit responses to these conditions. We first peruse this information to create a ‘base’ variable capturing the concurrent presence of a chronic condition. This is a dichotomous variable that takes the value one if the respondent has a chronic condition (27%; n=47,827 observations), and the value zero if he/she does not (73%; n=130,229). We then develop a more complex and insightful longitudinal measure of chronic conditions which splits the disease cycle into three stages. This takes the value zero if the respondent does *not* have a chronic condition (72%; n=120,314 observations), the value one if the respondent has a chronic condition which emerged since the

previous year (10%; n=15,701), and the value two if the respondent has a chronic condition which emerged more than one year before (18%; n=29,113). Individuals who previously reported having a chronic condition but no longer do so score zero in this variable. The sample used to construct the longitudinal measure of chronic conditions is smaller because it is not possible to determine whether the chronic conditions observed in Wave 1 had their onset within the previous year. Hence, all observations from Wave 1 are excluded from analyses using this measure.

The HILDA Survey contains time-varying information on individuals' marital status across all of its waves. We use this information to create a discrete variable separating respondents into: (i) married (50%, n=89,174), (ii) in a *de facto* relationship (13.2%, n=23,473), (iii) divorced, separated, or widowed (13.6%, n=24,274), and (iv) single (never married) (23.1%, n=41,135). This variable is used as a potential moderator of the relationship between the presence of a chronic condition and mental health in our regression models.

In our multivariate regression models we control for a set of factors known to be correlated with both the presence of a chronic condition and mental health, and which have been used in previous studies (Hollingshaus and Utz 2013; Schnittker 2005). These include respondent's age (in years), number of children (none, one, two or more), highest educational qualification (below school Year 12, school Year 12, professional qualification, degree or higher), employment status (employed, unemployed, not in the labour force), and household financial-year, disposable, regular income (adjusted to 2014 prices and expressed in AU\$10,000s). Gender-specific means and standard deviations for all model variables are shown in Table 1.

**Table 1.** Gender-specific sample means and standard deviations

	Women		Men		All	
	N	Mean/% (SD)	N	Mean/% (SD)	N	Mean/% (SD)
<i>Outcome variable</i>						
MHI-5 (transformed)	94,758	73.1 (17.5)	83,298	75.4 (16.7)	178,056	74.2 (17.1)
<i>Key explanatory variables</i>						
Has a chronic condition						
Yes	94,758	27%	83,298	27%	178,056	27%
No	94,758	73%	83,298	73%	178,056	73%
Has a chronic condition, over time						
No	87,928	72%	77,209	73%	165,137	72%
Yes, on the year of onset	87,928	10%	77,209	10%	165,137	10%
Yes, on a subsequent year	87,928	18%	77,209	17%	165,137	18%
Marital status						
Married	94,758	48%	83,298	52%	178,056	50%
In a <i>de facto</i> relationship	94,758	13%	83,298	13%	178,056	13%
Divorced, separated or widowed	94,758	18%	83,298	9%	178,056	14%
Single (never married)	94,758	21%	83,298	25%	178,056	23%
<i>Control variables</i>						
Age (in years)	94,758	44.8 (18.5)	83,298	44.4 (18.2)	178,056	44.7 (18.4)
Number of children ever had						
Zero	94,758	31%	83,298	37%	178,056	34%
One	94,758	11%	83,298	11%	178,056	11%
Two or more	94,758	57%	83,298	52%	178,056	55%
Educational attainment						
Below Year 12	94,758	39%	83,298	30%	178,056	34%
Year 12	94,758	16%	83,298	14%	178,056	15%
Professional qualification	94,758	23%	83,298	36%	178,056	29%
Degree	94,758	23%	83,298	21%	178,056	22%
Employment status						
Employed	94,758	58%	83,298	70%	178,056	64%
Unemployed	94,758	3%	83,298	4%	178,056	4%
Not in the labour force	94,758	39%	83,298	26%	178,056	33%
Household income (in A\$10,000s)	94,758	8.4 (6.4)	83,298	8.9 (6.5)	178,056	8.6 (6.5)

Notes: HILDA Survey data, 2001-2014.

## METHOD

To examine the multivariate associations between chronic conditions and mental health we estimate fixed-effects panel regression models that leverage the panel structure of the HILDA Survey data (Allison 2009). Fixed-effects models reduce bias in estimation that may result from correlations between unobserved person-specific (i.e. time-constant) factors and the explanatory and outcome variables. To accomplish this, fixed-effect models make exclusive use of the within-individual variance in the data: they assess how over-time changes in individuals' characteristics are associated with over-time changes in their outcomes. Effectively, individuals act as their own statistical controls (Allison 2009). In practice, the fixed-effects model is fitted using explanatory and outcome variables on which the 'within transformation' has been applied. Such transformation entails subtracting the person-specific means from each of the observation values. By doing this, fixed-effects models 'average out' time-invariant unobserved heterogeneity from the model, allow for arbitrary correlations between the observable and time-constant unobservable factors, and yield estimates which are not biased by omitted person-specific factors (Allison 2009). In our specific application, the person-specific factors that the fixed-effects model may account for include time-constant components of personality traits, individuals' idiosyncratic health expectations, socio-economic background and socialization, or personal subjectivity in reporting one's mental health. A representative fixed-effects model for our application can be expressed as:

$$(H_{it} - \bar{H}_i) = (C_{it} - \bar{C}_i)\beta_1 + (M_{it} - \bar{M}_i)\beta_2 + (X_{it} - \bar{X}_i)\beta_3 + (e_{it} - \bar{e}_i) \quad (1)$$

where subscripts  $i$  and  $t$  denote individuals and time periods, respectively;  $H$  is a continuous variable capturing mental health;  $C$  is one or more dummy variables capturing chronic conditions,  $M$  is a vector of marital status variables;  $X$  is a vector of explanatory variables; the  $\beta$ s are the model coefficients to be estimated; and  $e$  is the usual stochastic error term in regression. This model can also be expressed using the  $\hat{\phantom{x}}$  symbol to denote the 'within transformation':

$$\hat{H}_{it} = \hat{C}_{it}\beta_1 + \hat{M}_{it}\beta_2 + \hat{X}_{it}\beta_3 + \hat{e}_{it} \quad (2)$$

To assess whether the effect of chronic conditions on mental health is moderated by marital status we estimate fixed-effects models of the following form:

$$\hat{H}_{it} = \hat{C}_{it}\beta_1 + \hat{M}_{it}\beta_2 + (\hat{C}_{it} * \hat{M}_{it})\beta_3 + \hat{X}_{it}\beta_4 + \hat{e}_{it} \quad (3)$$

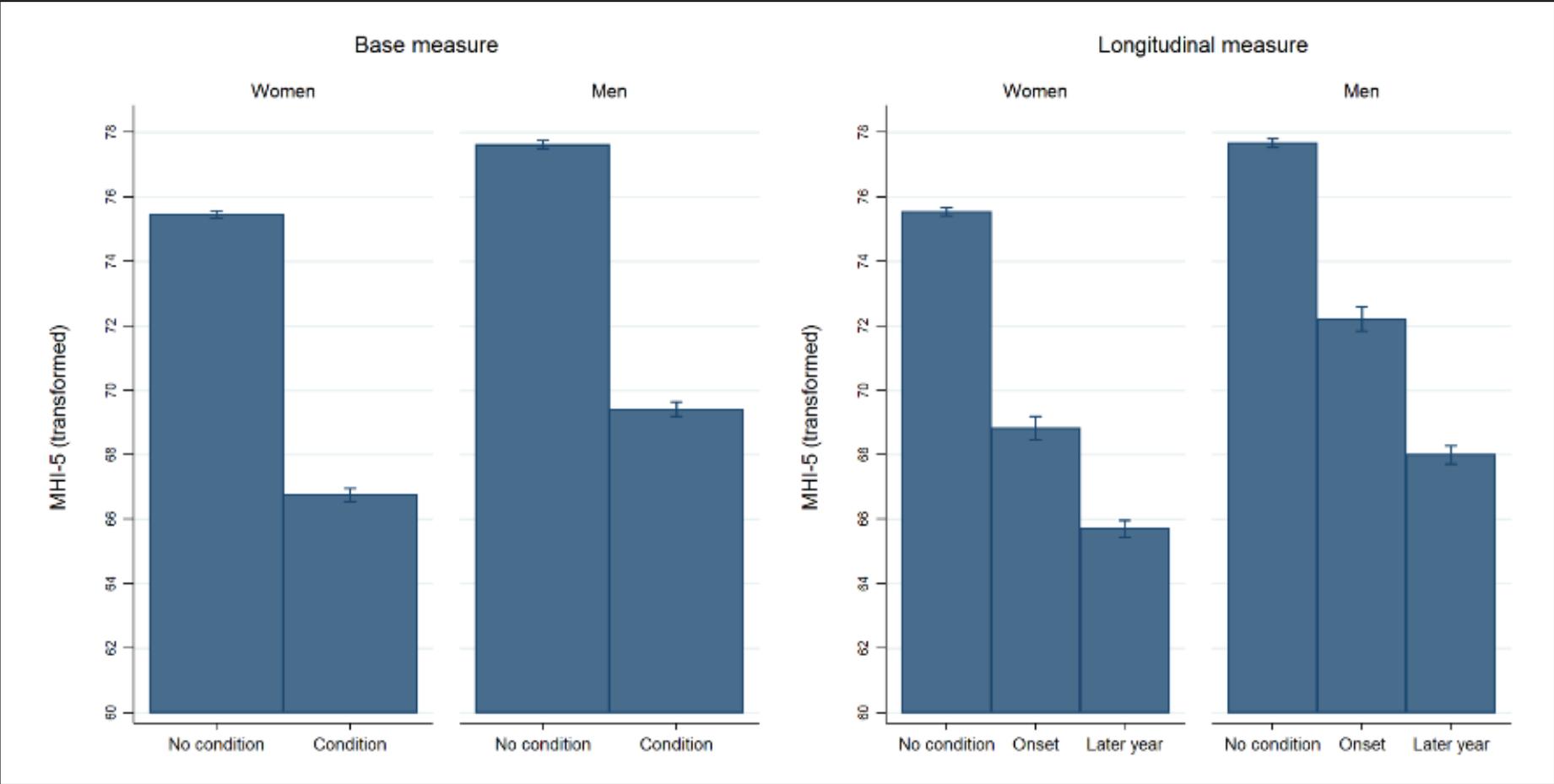
The magnitude and statistical significance of the estimated coefficient on the interactions between the chronic condition ( $C$ ) and marital status ( $M$ ) dummy variables, i.e.  $\beta_3$  in Equation (3), can be evaluated to assess whether there is evidence of moderation. The standard errors in all regression models adjust for the nesting of individuals within households.

## RESULTS

### Bivariate analyses

We begin by comparing average mental health levels for respondents with and without a chronic condition (Figure 1, left panel). When women do not experience a chronic condition, they report higher (i.e. better) mental health scores (mean=75.5) than when they do (mean=66.8). Mental health scores are also higher amongst men who do not report a chronic condition (mean=77.6), compared to men when they have a chronic condition (mean=69.4). In both cases, the differences are substantial and statistically significant at the 95% level –as illustrated by non-overlapping 95% confidence intervals. Consistent with previous studies, men display greater mental health levels than women, both in the presence and absence of a chronic condition. Use of the longitudinal measure of chronic conditions reveals that average mental health levels also vary across stages of the disease cycle (Figure 1, right panel). Both women and men observed in the onset year of a chronic condition report higher (i.e. better) mental health scores (mean<sub>wom</sub>=68.8; mean<sub>men</sub>=72.2) than when observed at a later stage of the disease cycle (mean<sub>wom</sub>=65.7; mean<sub>men</sub>=68). Again, the differences are substantial and statistically significant. This points to the mental toll of living with a chronic condition.

**Figure 1.** Average mental health (MHI-5)



Notes: HILDA Survey data, 2002-2014. Whiskers denote 95% confidence intervals.

### Fixed-effect regression models

To examine the relationships between mental health and chronic conditions more robustly, we turn to multivariate fixed-effect regression models. Amongst women, results from Model 1 in Table 2 indicate that having a chronic condition is associated with a decrease in mental health of about 3.19 units ( $p < 0.001$ ), on a scale of 0 to 100. The estimated coefficients on the dummy variables capturing marital status indicate that when women are divorced, separated or widowed ( $\beta = -2.49$ ;  $p < 0.001$ ) or when they are single ( $\beta = -1.22$ ;  $p < 0.001$ ), they report poorer mental health than when they are married. There are no differences in women's mental health when they are married compared to when they are in a *de facto* relationship ( $\beta = 0.01$ ;  $p > 0.1$ ).

Model 2 introduces interaction terms between the chronic condition and marital status variables, as a means to test whether marital status moderates the effects of chronic conditions on mental health. The results on the interaction terms provide some evidence of moderation. The adverse mental health effects of having a chronic condition are stronger when women are in a *de facto* relationship ( $\beta = -0.90$ ;  $p < 0.05$ ), divorced, separated or widowed ( $\beta = -0.67$ ;  $p < 0.05$ ), or single ( $\beta = -1.21$ ;  $p < 0.01$ ), compared to when they are married. However, Wald tests reject the hypothesis that the interaction effects between the health condition variable and the dummy variables for being in a *de facto* relationship, divorced/separated/widowed and single are statistically different from each other ( $p > 0.1$ ).

The magnitude of the chronic condition effect across each of the marital status categories (derived by combining the model's main and interaction effects) indicates that the expected drop in mental health levels when women live with a chronic condition is 2.74 units when they are married, 3.41 units when they are divorced, separated or widowed, 3.64 units when they are in a *de facto* relationship, and 3.95 units when they are single.

For men, results in Model 3 indicate that having a chronic condition is also associated with a decrease in mental health ( $\beta = -2.60$ ;  $p < 0.001$ ). When men are divorced, separated or widowed ( $\beta = -2.90$ ;  $p < 0.001$ ) or single ( $\beta = -0.85$ ;  $p < 0.01$ ), they tend to report poorer mental health than when they are married. There are no statistically significant differences between being married and living in a *de facto* relationship amongst men ( $\beta = 0.22$ ;  $p > 0.1$ ).

Results from Model 4 also provide some evidence of moderation by marital status amongst men. The adverse mental health effects of chronic conditions are stronger when men are in a *de facto* relationship ( $\beta = -0.73$ ;  $p < 0.1$ ) or single ( $\beta = -1.08$ ;  $p < 0.01$ ), compared to when they

are married. Again, Wald tests indicate that the interaction effects between the health condition variable and the dummy variables for being in a *de facto* relationship, divorced/separated/widowed and single are not statistically different from each other ( $p>0.1$ ).

For men, the expected decrease in mental health levels associated with having a chronic condition (calculated by combining the models' main and interaction effects) is 2.28 units when they are married, 2.59 units when they are divorced, separated or widowed, 3.01 units when they are in a *de facto* relationship, and 3.36 units when they are single. The results of the fully specified models for men and women (Models 2 and 4 in Table 2) are easier to grasp by visual inspection of Figure 2. This shows the predicted mental health levels of men and women with different experiences of chronic conditions and in different marital statuses.

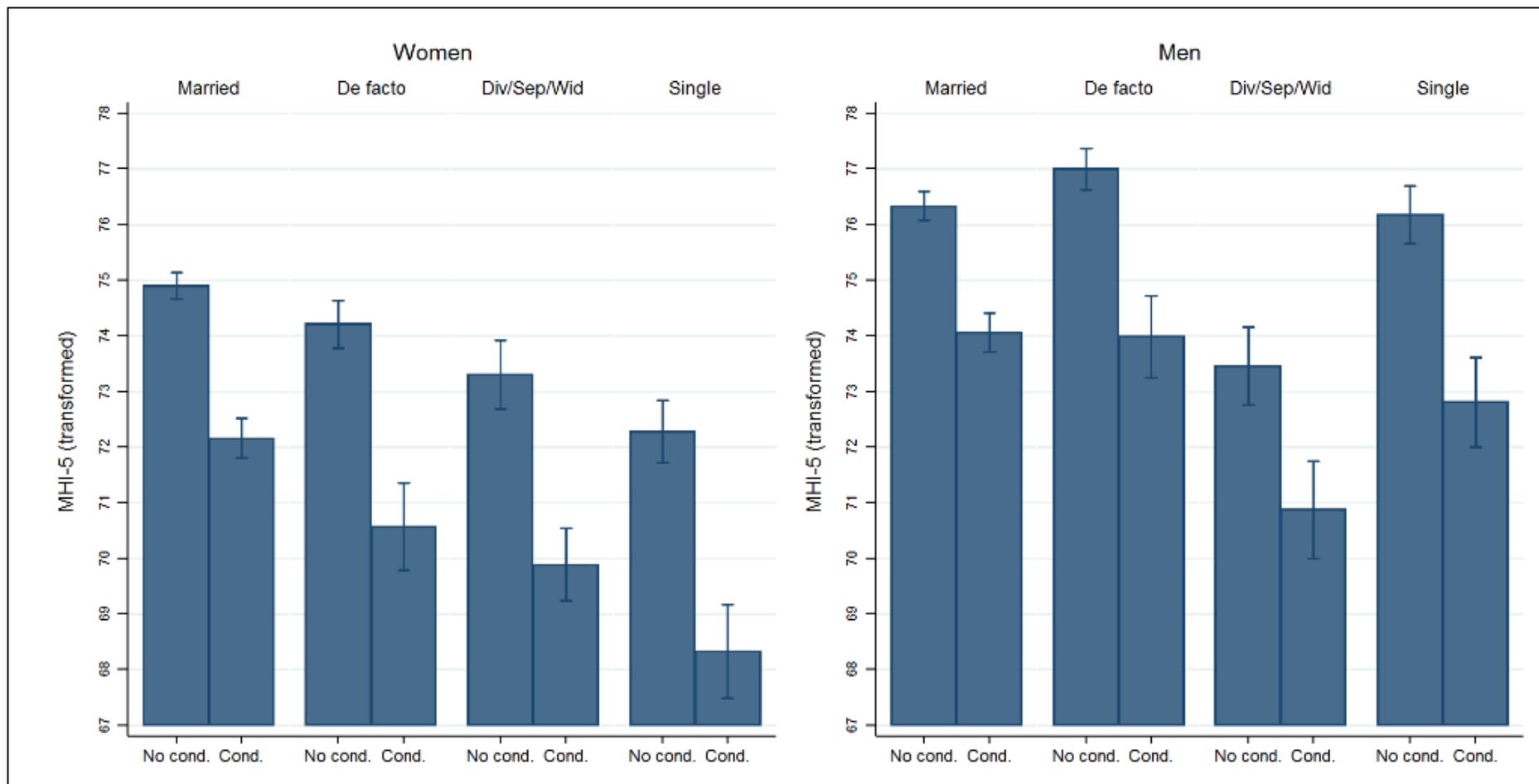
Altogether, results in this section are consistent with Hypothesis 1, but only for marriage: being married is associated with less deleterious consequences of having a chronic condition on mental health. The same does not apply to being in a *de facto* relationship. Hence, results are also consistent with Hypothesis 2: these protective effects are larger amongst individuals in marriages than *de facto* relationships.

**Table 2.** Fixed-effect models of the MHI-5 (transformed)

	Women <i>1</i>	Women <i>2</i>	Men <i>3</i>	Men <i>4</i>
Has a chronic condition	-3.19***	-2.74***	-2.60***	-2.28***
Marital status ( <i>ref. Married</i> )				
In a <i>de facto</i> relationship	0.01	0.18	0.22	0.35
Divorced, separated or widowed	-2.49***	-2.30***	-2.90***	-2.84***
Single (never married)	-1.22***	-1.03**	-0.85**	-0.69*
Marital status & chronic condition interactions				
Condition * In a <i>de facto</i> relationship		-0.90*		-0.73(*)
Condition * Divorced, separated or widowed		-0.67*		-0.31
Condition * Single (never married)		-1.21**		-1.08**
Control variables				
Age (in years)	0.08***	0.08***	0.03**	0.03*
Number of children ever had ( <i>ref. Zero</i> )				
One	1.05***	1.08***	-0.27	-0.25
Two or more	-0.48	-0.45	-1.41***	-1.38***
Educational attainment ( <i>ref. Degree</i> )				
Below Year 12	-0.35	-0.38	2.34***	2.32***
Year 12	-1.15**	-1.18**	1.01*	0.99*
Professional qualification	-0.54	-0.56	0.79(*)	0.78(*)
Employment status ( <i>ref. Employed</i> )				
Unemployed	-0.66*	-0.65*	-1.93***	-1.92***
Not in the labour force	-0.66***	-0.66***	-1.34***	-1.33***
Household income (in A\$10,000s)	0.02*	0.02*	0.04***	0.04***
<i>Wald tests</i>				
$\beta(\text{condition}*\textit{de facto})=\beta(\text{condition}*\textit{divorced})$		n.s.		n.s.
$\beta(\text{condition}*\textit{de facto})=\beta(\text{condition}*\textit{single})$		n.s.		n.s.
$\beta(\text{condition}*\textit{divorced})=\beta(\text{condition}*\textit{single})$		n.s.		n.s.
N (observations)	94,758	94,758	83,298	83,298
N (individuals)	14,086	14,086	13,090	13,090
R <sup>2</sup> (within)	0.010	0.010	0.010	0.010

Notes: HILDA Survey data, 2001-2014. Fixed effect models. Unstandardized model coefficients. Standard errors are clustered for the nesting of observations within households. Significance levels: (\*) p<0.1, \* p<0.05, \*\* p<0.01, \*\*\* p<0.001, n.s. p>0.1.

**Figure 2.** Predicted mental health (MHI-5), base chronic condition measure



Notes: HILDA Survey data, 2002-2014. Whiskers denote 95% confidence intervals.

Based on results from Models 2 (women) and 4 (men) in Table 2. Values of the covariates set at the sample means.

The results presented in Table 3 are from models using the second, more detailed measure of chronic conditions that better incorporates the longitudinal dimensions of the disease cycle. When women have a chronic condition on the year of onset, they report worse mental health than when they do not have a condition ( $\beta=-2.78$ ;  $p<0.001$ ) (Model 5). The adverse effects of having a chronic condition are even stronger when women are observed at a later stage in the disease cycle ( $\beta=-3.57$   $p<0.001$ ). Wald tests confirm that this difference is statistically significant ( $p<0.001$ ).

Model 6 for women provides evidence of moderation in the effects of the longitudinal measure of chronic conditions on mental health by marital status and that, to some extent, the pattern of moderation varies across stages of the disease cycle. When combining the main and interactive effects, the mental health impacts of being in the onset year of a chronic condition (compared to not having a condition) are largest when women are in a *de facto* relationship ( $-3.34$  units), followed by when they are divorced, separated or widowed ( $-2.97$  units), single ( $-2.84$  units), and married ( $-2.18$  units). This ordering changes when one considers the mental health impacts of being in a subsequent year of a chronic condition (compared to not having a condition). For this category, the largest mental health ‘penalties’ occur when women are single ( $-4.17$  units), followed by when they are in a *de facto* relationship ( $-3.67$  units), divorced, separated or widowed ( $-3.66$  units), and married ( $-3.31$  units). However, only two of six Wald tests indicate that differences in the coefficients for being in a *de facto* relationship, divorced/separated/widowed and single are statistically significant.

There is also evidence of differences in mental health across stages of the disease cycle in the male sample. Men’s average mental health is 2.16 units ( $p<0.001$ ) lower when they are in the year of onset of a chronic condition, compared to when they have no chronic conditions (Model 7). For a chronic condition observed at a subsequent year, the analogous figure is 3.07 units ( $p<0.001$ ). Wald tests confirm that this difference is statistically significant ( $p<0.001$ ).

Model 8 provides further evidence of moderation by marital status amongst men. Taking the main and interaction effects together, being in the onset year of a chronic condition takes the greatest toll on men’s mental health when they are single ( $-2.99$  units), followed by when they are divorced, separated or widowed ( $-2.54$  units), in a *de facto* relationship ( $-2.24$  units), and married ( $-1.79$  units). Chronic conditions observed after the year of onset have the largest negative effects on men’s mental health when men are single ( $-4.17$  units), followed by when they are in a *de facto* relationship ( $-4.04$  units), married ( $-2.71$  units), and divorced, separated

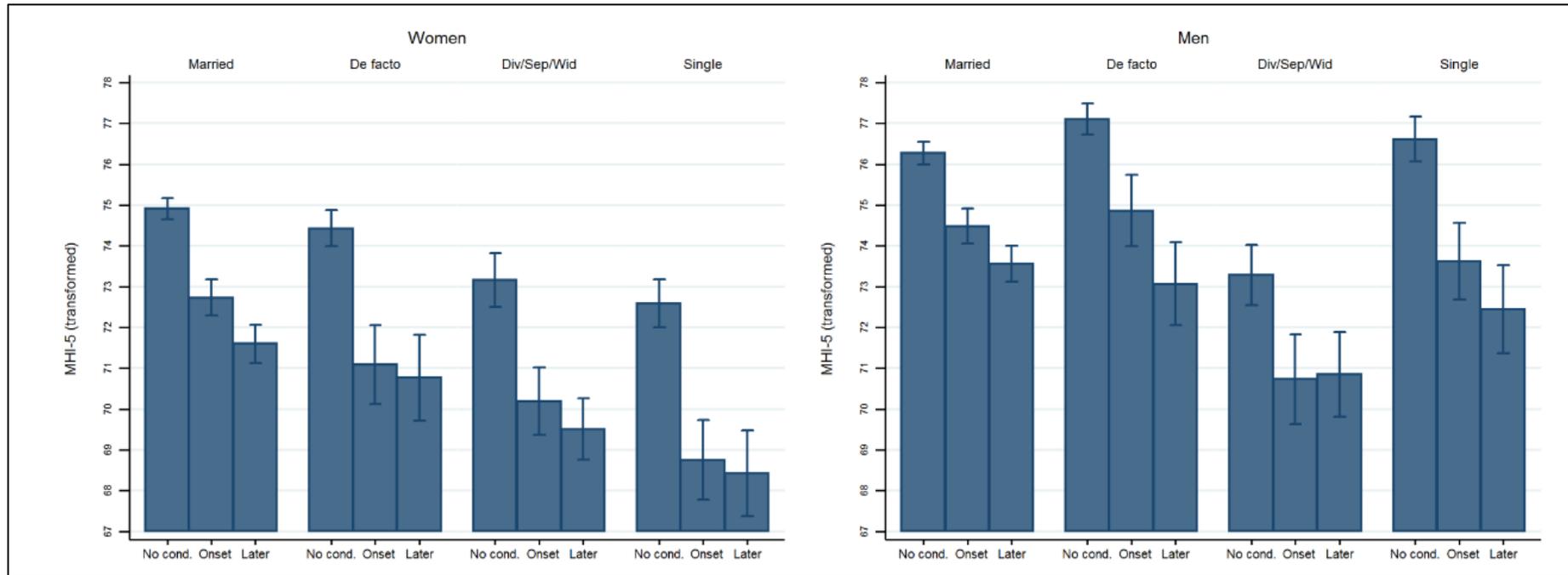
or widowed (−2.43 units). The results of the models with interactions for both men and women, Models 6 and 8, are visually represented in Figure 3.

**Table 3.** Fixed-effect models of the MHI-5 (transformed)

	Women 5	Women 6	Men 7	Men 8
Has a chronic condition ( <i>ref. No</i> )				
On the year of onset	-2.78***	-2.18***	-2.16***	-1.79***
On a subsequent year	-3.57***	-3.31***	-3.04***	-2.71***
Marital status ( <i>ref. Married</i> )				
In a <i>de facto</i> relationship	0.13	0.26	0.19	0.35
Divorced, separated or widowed	-2.48***	-2.34***	-2.88***	-2.92***
Single (never married)	-1.10***	-0.91**	-0.76*	-0.55(*)
Marital status & chronic condition interactions				
Condition, onset * In a <i>de facto</i> relationship		-1.16*		-0.45
Condition, onset * Divorced, separated or widowed		-0.79*		-0.75
Condition, onset * Single (never married)		-1.66***		-1.20**
Condition, no onset * In a <i>de facto</i> relationship		-0.36		-1.33*
Condition, no onset * Divorced, separated or widowed		-0.35		0.28
Condition, no onset * Single (never married)		-0.86		-1.46**
Control variables				
Age (in years)	0.07***	0.07***	0.02(*)	0.02(*)
Number of children ever had ( <i>ref. Zero</i> )				
One	1.02***	1.05***	-0.43	-0.40
Two or more	-0.57(*)	-0.55(*)	-1.51***	-1.47***
Educational attainment ( <i>ref. Degree</i> )				
Below Year 12	-0.33	-0.36	2.60***	2.56***
Year 12	-1.05**	-1.07**	1.26**	1.24**
Professional qualification	-0.40	-0.43	0.82(*)	0.79
Employment status ( <i>ref. Employed</i> )				
Unemployed	-0.56(*)	-0.55(*)	-1.97***	-1.96***
Not in the labour force	-0.72***	-0.71***	-1.29***	-1.29***
Household income (in A\$10,000s)	0.03*	0.03*	0.05***	0.05***
Wald tests				
$\beta(\text{cond\_onset})=\beta(\text{cond\_no\_onset})$	***	***	***	***
$\beta(\text{cond\_onset*de facto})=\beta(\text{cond\_onset*divorced})$		n.s.		n.s.
$\beta(\text{cond\_onset*de facto})=\beta(\text{cond\_onset*single})$		n.s.		n.s.
$\beta(\text{cond\_onset*divorced})=\beta(\text{cond\_onset*single})$		n.s.		n.s.
$\beta(\text{cond\_no\_onset*de facto})=\beta(\text{cond\_no\_onset*divorced})$		n.s.		*
$\beta(\text{cond\_no\_onset*de facto})=\beta(\text{cond\_no\_onset*single})$		n.s.		n.s.
$\beta(\text{cond\_no\_onset*divorced})=\beta(\text{cond\_no\_onset*single})$		n.s.		*
N (observations)	87,928	87,928	77,209	77,209
N (individuals)	13,439	13,439	12,466	12,466
R <sup>2</sup> (within)	0.010	0.010	0.010	0.011

**Notes:** HILDA Survey data, 2002-2014. Fixed effect models. Unstandardized model coefficients. Standard errors are clustered for the nesting of observations within households. Significance levels: (\*) p<0.1, \* p<0.05, \*\* p<0.01, \*\*\* p<0.001, n.s. p>0.1.

**Figure 3.** Predicted mental health (MHI-5), longitudinal chronic condition measure



Notes: HILDA Survey data, 2002-2014. Whiskers denote 95% confidence intervals. Based on results from Models 6 (women) and 8 (men) in Table 3. Values of the covariates set at the sample means.

Altogether, results from these models provide some support for Hypothesis 3: for both men and women the protective effect of marriage observed for the year of disease onset changes over time. For women, it fades, while for men it becomes stronger.

## **DISCUSSION AND CONCLUSION**

In this paper we have reassessed the longitudinal associations between chronic conditions and mental health. We innovate by combining principles from stress process theory and the life-course approach to theorise and test the role of marital status as a factor moderating the negative association between chronic conditions and mental health, and how this changes over time. Our empirical analyses relied on 14 years of nationally representative, panel data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey, and fixed-effects panel regression models.

Consistent with previous studies, we find that for both men and women chronic conditions are associated with poorer mental health (Hollingshaus and Utz 2013; Polsky et al. 2005; Pudrovska 2010) and marriage is associated with a health premium relative to singlehood, divorce, separation and widowhood (Rendall et al. 2011). We innovate by considering marital status as a moderator of the chronic conditions/mental health nexus, finding some evidence in favour of our first two hypotheses: the effects of having a chronic condition on mental health are smaller when individuals are married compared to unpartnered (Hypothesis 1) and married compared to in *de facto* relationships (Hypothesis 2). There were however no differences when individuals were in *de facto* relationships and when individuals were unpartnered. These results resonate with those previously reported by Bierman (2012), who found that marriage protected elderly men from depressive symptoms associated with the functional limitations of chronic conditions.

The magnitude of the estimated main effects of marital status and chronic conditions on mental health is sizeable. For example, the coefficient on being divorced amounts to about 14% of the measure's standard deviation amongst women (Model 1) and 17% amongst men (Model 3). The analogous figures the coefficients on having a chronic condition are 18% for women and 16% for men. The magnitude of the interactive effects is understandably lower, yet important. For example, the protective effect of being married relative to single amounts to up to 7% of the overall standard deviation of the mental health measure for both women and men. While

this may be considered a seemingly small effect, its size is comparable to that of factors to which the literature has paid more attention. For example, it is similar to the effects of having one relative to no children amongst women, having two relative to no children amongst men, and having completed secondary school relative to not having done so amongst both men and women. In addition, while the mental health gains associated with being married are relatively small for single individuals, these need to be understood in a societal context: their cumulative effects over the population are likely to result in substantial societal costs. This is important, as good mental health while living with a chronic condition is strongly associated with adherence to medical recommendations, disease management, recovery and mortality (DiMatteo et al. 2000; Carney et al. 2002).

Altogether, this first set of findings is highly consistent with stress process theory, and highlights the importance of considering marital status as a resource that has the potential to ease the deleterious effects of having a chronic condition on mental health. The mechanisms theorized to produce the observed marriage buffer (ranging from emotional support to financial benefits) may as well operate in the context of other stressors with flow-on effects on mental health, and so marriage should be considered more systematically as a potential moderator in those cognate contexts, where not yet done.

When considering temporal dynamics in the panel data, we also find some support for our last hypothesis: the protective effect of marriage against the negative mental health effects of chronic conditions changes over the disease cycle and in gendered ways (Hypothesis 3). For women, this protective effect is apparent for the year of disease onset, but fades over time. For men, the reverse holds true. This gender difference is consistent with reports of differences in spousal caregiving between men and women, with women being more likely than men to provide care and to provide greater amounts of it (Moen, Robison, and Fields 1994; Goldzweig et al. 2009; Katz et al. 2000; Noël-Miller 2010; Spitze and Ward 2000). Altogether, our findings suggest that the presence of a spouse has changing implications for one's mental health over the disease cycle. More generally, they contribute to stress process theory by highlighting how social stressors and sources of support may operate in a dynamic manner. Cross-sectional examinations may mask important variation over time. This highlights the value of incorporating some elements of life-course theory, including its focus on how events unfold over time, into the stress process framework as a means to unpack how the intersections between stressors, resources and health outcomes change over time (Pearlin, 2010).

Despite our several contributions to the literature, there are important limitations to our study that must be acknowledged, and which point towards avenues for future refinement. First, as others before us (see e.g. Hollinghaus and Utz 2013; Patten 1999; Schnittker 2005), we use only a coarse, binary measure of whether or not individuals have a chronic health condition. This does not distinguish the number of conditions, their nature, or the severity of the symptoms. It is also mute about how these symptoms affect functional limitations, and the degree to which the symptoms or their effects evolve over time. Hence, our results are a broad starting point, and likely mask heterogeneity in the ways in which marital status and mental health intersect for individuals with different types of specific chronic conditions. Future research should pay attention to effect heterogeneity along these dimensions.

Second, while we are amongst the first to add a longitudinal dimension to the study of the relationships of interest using a national sample, further studies could make more exhaustive use of the longitudinal data at hand. Here, we split the disease cycle into two components: the year of onset (given its practical and symbolic importance) and subsequent years. Future studies could look into more finely grained overtime trends after the year of disease onset. Practical difficulties with this course of action include challenges associated with treating cases in which the chronic condition remits and practical issues around reduced sample sizes at later stages of the disease cycle.

Third, while our results are informative of the main and interactive effects of chronic conditions and marital status on mental health, they are silent about the mechanisms driving these associations. We read our findings as suggesting partnerships (especially marriages) as an important source of social support. Subsequent studies may delve further into the specific types of such support that partners provide. Subject to data availability, empirical scrutiny may be given to aspects such as the different types of instrumental and emotional support discussed before, the role of relationship commitment and quality, or cross-spousal effects on mental health (Thomeer, Umberson, and Purdrowska 2013). Particularly, it may be important to split the buffering effect of being married into a ‘marriage selection effect’ (i.e. individuals with characteristics fostering partners’ resilience being more likely to get married) and a ‘marriage effect’ (i.e. any effects attributable to marriage itself) (Blekesaune 2008; Guner, Kulikova, and Lull 2014).

Despite these shortcomings, our findings have significant implications for health policy and practice. The interaction effect found for marriage and the presence of a chronic condition

indicates that the mental health of people who are not married may be comparatively vulnerable to being diagnosed and living with a chronic illness. This is a policy-relevant finding, as it points towards the need for institutional intervention to ensure that the mental health levels of unmarried individuals remain stable over the disease cycle. The provision of extra support from external sources to compensate for the absence of a spouse should be considered. Options may include an array of social support interventions, including involvement in informational support groups where patients can learn about ways to manage their illness (Helgeson and Cohen 1996; Thomas and Melvin 1995).

While the magnitude of the individual effects in our finding is only moderate, the population accumulation of such effects constitutes a public health problem. The associated economic and social costs at societal level are also likely to grow in the near future: the population in advanced economies such as Australia is rapidly ageing, chronic illness is increasingly prevalent, and the incidence and duration of marriages is in decline (ABS 2015; Jain 2007; Kennedy and Ruggles 2014). Collectively, these patterns suggest that, while population ageing may lead to more people living with chronic illness and for longer spells of time, the benefits conferred by having a spouse in buffering the mental strain of a chronic condition will apply to a shrinking proportion of the population. Addressing these issues is thus an important challenge for social and public health policy, and will require more scholarly attention.

## REFERENCES

- Adelman, Ronald D., Lyubov L. Tmanova, Diana Delgado, Sarah Dion, and Mark S. Lachs. 2014. "Caregiver Burden: A Clinical Review." *JAMA* 311(10):1052-1060.
- Allison, Paul D. 2009. *Fixed effects regression models*. Thousand Oaks: SAGE publications.
- August, Kristin J. and Dara H. Sorkin. 2010. "Marital Status and Gender Differences in Managing a Chronic Illness: The Function of Health-Related Social Control." *Social Science and Medicine* 71(10):1831-1838.
- Australian Bureau of Statistics. 2015. "Marriages and Divorces, Australia, 2014" (cat. no. 331.0). Canberra: ABS.
- Australian Institute of Health and Welfare. 2014. "Chapter 4. Chronic Disease—Australia's Biggest Health Challenge" (Australia's health series no.14, Cat.No.AUS178). Canberra: AIHW.
- Avison, William R. and R.J. Turner. 1988. "Stressful Life Events and Depressive Symptoms: Disaggregating the Effects of Acute Stressors and Chronic Strains." *Journal of Health and Social Behavior* 29(3):253-264.
- Berkman, Lisa F. and Thomas Glass, T. 2000. "Social Integration, Social Networks, Social Support, and Health." *Social Epidemiology* 1:137-173.
- Bierman, Alex. 2012. "Functional Limitations and Psychological Distress: Marital Status as Moderator." *Society and Mental Health* 2(1):35-52.
- Blekesuane, Morten. 2008. "Partnership Transitions and Mental Distress: Investigating Temporal Order." *Journal of Marriage and Family* 70(4):879-890.
- Booth, Alan and David R. Johnson. 1994. "Declining Health and Marital Quality". *Journal of Marriage and Family* 56(1):218-223.
- Bury, Michael. 1982. "Chronic Illness as Biographical Disruption." *Sociology of Health and Illness* 4(2):167-82.
- Carney, Robert M., Kenneth E. Freedland, Gregory E. Miller, and Allen S. Jaffe. 2002. "Depression as a Risk Factor for Cardiac Mortality and Morbidity: A Review of Potential Mechanisms." *Journal of Psychosomatic Research* 53:897-902.
- Clarke, David M. and Kay C. Currie. 2009. "Depression, Anxiety and Their Relationship with Chronic Diseases: A Review of the Epidemiology, Risk and Treatment Evidence." *The Medical Journal of Australia* 190(7):54-60.
- Cohen, Sheldon. 2004. "Social Relationships and Health." *American Psychologist* 59(8):676-684.
- Cohen, Sheldon and Thomas A. Wills. 1985. "Stress, Social Support, and the Buffering Hypothesis." *Psychological Bulletin* 98(2):310-357.
- Coombs, Robert H. 1991. "Marital Status and Personal Well-Being: A Literature Review." *Family Relations* 40(1):97-102.

- De Ridder, Denise, Rinie Geenen, Roeline Kuijer, and Henriët van Middendorp. 2008. "Psychological Adjustment to Chronic Disease." *The Lancet* 372(9634):246-55.
- DiMatteo, M.R., Heidi S. Lepper, and Thomas W. Croghan. 2000. "Depression is a Risk Factor for Noncompliance with Medical Treatment: Meta-Analysis of The Effects of Anxiety and Depression on Patient Adherence." *Archives of Internal Medicine* 160(14):2101-7.
- Dunlop, Dorothy D., John S. Lyons, Larry M. Manheim, Jing W. Song, and Rowland W. Chang. 2004. "Arthritis and Heart Disease as Risk Factors for Major Depression: The Role of Functional Limitation." *Medical Care* 42(6):502-511.
- Essue, B., P. Kelly, M. Roberts, S. Leeder, and S. Jan. 2011. "We Can't Afford My Chronic Illness! The Out-Of-Pocket Burden Associated with Managing Chronic Obstructive Pulmonary Disease in Western Sydney, Australia." *Journal of Health Services Research & Policy* 16(4):226-231.
- Fiori, Katherine L., Jacqui Smith, and Toni C. Antonucci. 2007. "Social Network Types among Older Adults: A Multidimensional Approach." *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences* 62(6):322-30.
- Goldzweig, Gil, Ayala Hubert, Natalio Walach, Baruch Bremner, Shlomit Perry, Elisabeth Andritsch and Lea Baider. 2009. "Gender and Psychological Distress Among Middle-And Older-Aged Colorectal Cancer Patients and Their Spouses: An Unexpected Outcome." *Critical Reviews in Oncology/Hematology* 70(1):71-82.
- Guner, Neziha, Yuliya Kulikova, and Joan Lull. 2014. "Does Marriage Make You Healthier?" (IZA Discussion Paper No. 8633). Bonn: IZA.
- Helgeson, Vicki S. and Sheldon Cohen. 1996. "Social Support and Adjustment to Cancer: Reconciling Descriptive Correlational, and Intervention Research." *Healthy Psychology* 15(2):135-48.
- Holahan, Carole K., Charles J. Holahan, and Sharyn S. Belk. 1984. "Adjustment in Aging: The Roles of Life Stress, Hassles and Self-Efficacy." *Health Psychology* 3(4):315-328.
- Hollingshaus, Michael S. and Rebecca L. Utz. 2013. "Depressive Symptoms Following the Diagnosis Of Major Chronic Illness." *Society and Mental Health* 3(1):22-39.
- House, James S., Karl R. Landis, and Debra Umberson. 1988. "Social Relationships and Health." *Science* 241(4865):540-5.
- Jain, Shail. 2007. "Lifetime Marriage and Divorce Trends." (Australian Social Trends, 2007). Canberra: Australian Bureau of Statistics.
- Kasl, Stanislav V. and Beth A Jones. 2000. "The Impact of Job Loss and Retirement on Health." In: Berkman, L.F. & I. Kawachi (eds.). *Social Epidemiology*. New York: Oxford University Press, pp. 118-136.

- Katz, Steven J., Mohammed Kabeto and Kenneth M. Langa. 2000. "Gender Disparities in the Receipt of Home Care for Elderly People with Disability in the United States." *JAMA* 284:3022-3027.
- Kennedy, S., & Ruggles, S. 2014. Breaking up is hard to count: The rise of divorce in the United States, 1980-2010. *Demography*, 51(2), 587-598.
- Kristofferzon, Marja-Leena, Rurik Lofmark, and Marianne Carlsson. 2003. "Myocardial Infarction: Gender Differences in Coping and Social Support." *Journal of Advanced Nursing* 44(4):360-374.
- Mechanic, David and Edmund H. Volkart. 1961. "Stress, Illness Behavior, and the Sick Role." *American Sociological Review* 26(1):51-58.
- Meyer, Thomas J. and Melvin M. Mark. 1995. "Effects of psychosocial interventions with adult cancer patients: A meta-analysis of randomized experiments." *Health Psychology* 14(2):101-108.
- Moen, Phyllis, Julie Robison and Vivian Fields. 1994. "Women's Work and Caregiving Roles: A Life Course Approach." *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences* 49(4):S176-S186.
- Newman, Stanton, Liz Steed, and Kathleen Mulligan. 2004. "Self-Management Interventions for Chronic Illness." *The Lancet* 364(9444):1523-37.
- Noël-Miller, Claire. 2011. "Partner Caregiving in Older Cohabiting Couples." *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences* 66B(3):341-53.
- Noël-Miller, Claire. 2010. "Longitudinal Changes in Disabled Husbands' and Wives' Receipt of Care." *The Gerontologist* 50(5):681-693.
- Patten, Scott B. 1999. "Long-Term Medical Conditions and Major Depression in the Canadian Population." *Canadian Journal of Psychiatry* 44(2):151-157.
- Pearlin, Leonard I. 1989. "The Sociological Study of Stress." *Journal of Health and Social Behavior* 30(3):241-256.
- Pearlin, Leonard I. 2010. "The Life Course and the Stress Process: Some Conceptual Comparisons." *Journal of Gerontology Series B: Social Sciences* 65B(2):207-215.
- Pearlin, Leonard I., Elisabeth G. Menaghan, Morton A. Lieberman, and Joseph T. Mullan. 1981. "The Stress Process." *Journal of Health and Social Behavior*, 22(4):337-356.
- Perry, Brea L. 2011. "The Labeling Paradox: Stigma, the Sick Role, and the Social Networks in Mental Illness." *Journal of Health and Social Behavior* 52(4):460-477.
- Pitceathly, C. and P. Maguire. 2003. "The Psychological Impact of Cancer on Patients' Partners and Other Key Relatives: A Review." *European Journal of Cancer* 39(11):1517-1524.

- Polsky, Daniel, Jalpa A. Doshi, Steven Marcus, David Oslin, Aileen Rothbard, Niku Thomas, and Christy L. Thompson. 2005. "Long-Term Risk for Depressive Symptoms after a Medical Diagnosis." *Archives of Internal Medicine* 165(11):1260–66.
- Pudrovska, Tetyana. 2010. "Why Is Cancer More Depressing for Men than Women among Older White Adults?" *Social Forces* 89(2):535–558.
- Rendall, Michael, Margaret M. Weden, Melissa M. Favreault, and Hilary Waldron. 2011. "The Protective Effect of Marriage For Survival: A Review and Update." *Demography*, 48(2):481-506.
- Schafer, Markus H. and Jonathan Koltai. 2015. "Cancer Diagnosis and Mental Health among Older White Adults: Moderating Role for Social Networks." *Society and Mental Health* 5(3):282-202.
- Schnittker, Jason. 2005. "Chronic Illness and Depressive Symptoms in Late Life." *Social Science & Medicine* 60:13-23.
- Serido, Joyce, David M. Almeida, and Elaine Wethington. 2004. "Chronic Stressors and Daily Hassles: Unique and Interactive Relationships with Psychological Distress." *Journal of Health and Social Behavior* 45(1):17-33.
- Spitze, Glenna and Russell R. Ward. 2000. "Gender, Marriage, and Expectations for Personal Care." *Research on Aging* 22(5):451-469.
- Stanton, Annette L., Tracey A. Revenson, and Howard Tennen. 2007. "Health Psychology: Psychological Adjustment to Chronic Disease." *Annual Review of Psychology* 58:565–92.
- Summerfield, Michelle, Simon Freidin, Markus Hahn, Ning Li, Ninette Macalalad, Laura Mundy, Nicole Watson, Roger Wilkins, and Mark Wooden. 2015. *HILDA User Manual – Release 14*. Melbourne: Melbourne Institute of Applied Economic and Social Research.
- Thomeer, Mieke B., Debra Umberson, and Tetyana Pudrovska. 2013. "Marital Processes around Depression: A Gendered and Relational Perspective." *Society and Mental Health* 3:151-169.
- Umberson, Debra. 1987. "Family Status and Health Behaviors: Social Control as a Dimension of Social Integration." *Journal of Health and Social Behavior* 28(3):306-319.
- van't Spijker, A., R.W. Trijsburg, and H.J. Duivenvoorden. 1997. "Psychological Sequelae of Cancer Diagnosis: A Meta-Analytical Review of 58 Studies after 1980." *Psychosomatic Medicine* 59(3):280-293.
- Ward, Brian W., Jeannine S. Schiller, and Richard A. Goodman. 2014. "Multiple Chronic Conditions among US Adults: A 2012 Update." *Preventing Chronic Disease*, 11:E62.

- Ware, John E. Jr., and Cathy D. Sherbourne. 1992. "The MOS 36-Item Short-Form Health Survey (SF-36): I. Conceptual Framework and Item Selection." *Medical Care* 30(6):473-483.
- Wiik, Kenneth A., Eva Bernhardt, and Turid Noack. 2009. "A Study of Commitment and Relationship Quality in Sweden and Norway." *Journal of Marriage and Family* 71(3):465-477.
- Wiik, Kenneth A., Renske Keizer, and Trude Lappegård. 2012. "Relationship Quality in Marital and Cohabiting Unions across Europe." *Journal of Marriage and Family* 74(3):389-398.
- Willig, Carla. 2011. "Cancer Diagnosis as Discursive Capture: Phenomenological Repercussions of Being Positioned within Dominant Constructions of Cancer." *Social Science & Medicine* 73:897-903.