

The impact of informal care provision on the caregiver partner's mental health *

Marie Blaise[†]

October 15, 2019

Abstract

Using data from the Survey of Health, Ageing and Retirement in Europe (SHARE), we address how care provision by adult children affects the mental health of their partners. We control for the endogeneity due to the simultaneity of informal care provision and mental health issues with instrumental variables (IV) using the distance between respondents' and parents' households and the number of respondents' sisters as instruments. The results suggest that a higher intensity of care provided by the respondent to her own old-age parents leads to a smaller depression rate of her partner. In order to explain the positive impact of the informal care provision, we highlight two channels: the role of parental health and the follow-up depressive symptoms within the couple. We find that parental health has a negative impact on the partner's depression but does not conflate with the care effect. We control for the influence of caregiving on the respondents' mental health to understand whether spillover effects inside the couple exist. The results suggest that only men respondents and their partners are impacted by the caregiving activity in a similar way.

Keywords: Informal care, households, mental health.

JEL codes: D12, D13, J14

*This paper uses data from SHARE Waves 4, 5 and 6 (DOIs: 10.6103/SHARE.w4.600, 10.6103/SHARE.w5.600, 10.6103/SHARE.w6.600), see Börsch-Supan et al. (2013) for methodological details. The SHARE data collection has been primarily funded by the European Commission through FP5 (QLK6-CT-2001-00360), FP6 (SHARE-I3: RII-CT-2006-062193, COMPARE: CIT5-CT-2005-028857, SHARE-LIFE: CIT4-CT-2006-028812) and FP7 (SHARE-PREP: N°211909, SHARE-LEAP: N°227822, SHARE M4: N°261982). Additional funding from the German Ministry of Education and Research, the U.S. National Institute on Aging (U01_AG09740-13S2, P01_AG005842, P01_AG08291, P30_AG12815, R21_AG025169, Y1-AG-4553-01, IAG_BSR06-11, OGHA_04-064) and from various national funding sources is gratefully acknowledged (see www.share-project.org).

[†]BETA, University of Strasbourg, 61 avenue de la Forêt Noire, 67085 Strasbourg Cedex (France). Email: marie.blaise@unistra.fr

1 Introduction

For several decades, most European countries face up to the ageing population. Lower birth rates, decline in infant mortality and rising life expectancies explain such a demographic change. However, people living longer are more likely to need help due to cognitive or physical impairments rising with ageing. By 2060, the elderly dependency ratio might achieve the highest level of more than one old-age individual for every two working persons (Lanzieri, 2011). This fast-growing old-age population in need is mainly cared informally, either by family members or close relatives. Although the informal care provision is usually considered as more accessible and cheaper than the support provided by the State or via the private sector, it might impact caregivers' everyday life. Previous studies have widely documented that providing informal help can result in a series of effects on carers' health and family time.

The main goal of this paper is to analyze how the informal care provision impacts carers' family members. More precisely, we are interested in the well-being of individuals whose partners care for their own old-age parents.

The provision of informal help adversely impacts carers' health as this task is expected to be mentally stressful and time-consuming (Hirst, 2005; Chappell and Reid, 2002; Cooper *et al.*, 2007). A meta-analysis by Pinguart and Sørensen (2003) highlights the negative impact of the informal care provision on psychological health of caregivers. More precisely, they find significant differences between caregivers and noncaregivers in perceived stress, depression, general subjective well-being, physical health, and self-efficacy (see also Schulz *et al.*, 1995). Not only caregivers are psychologically weakened by carrying out support activities but they also bear physical costs. According to Pinguart and Sørensen (2007), several channels might explain the negative impact on caregivers physical health. First, caring for people over a long period of time causes physical impairments such as arthritis or back problems. Then, caregivers might neglect themselves, adopting an unhealthy lifestyle. Finally, psychological and physical health being highly correlated, caregivers suffering from distress or burden are more vulnerable to hypertension or heart diseases.

Informal care and health are highly related, not only because the caregiving process itself consists of unpleasant and difficult tasks to carry out repeatedly but also because caregivers witness continuously impairments of people they care about. In this regard, Bobinac *et al.* (2010) highlight the direct impact of "the health of a patient on the welfare" on someone else, the so-called "family effect". The latter has to be distinguished from the "caregiving effect" that refers to the impact of the informal care provision. Contrary to the caregiving effect, the family effect is related to the fact that people are directly influenced by their

close relatives' health, whether or not they provide care. The authors show that not accounting for the family effect overestimates the care effect by 30%.

However, the prevalence of adverse effects of the help provision on health has to be qualified as it may depend on specific socio-demographics characteristics. For instance, a close and loving relationship between the caregiver and the care recipient leads to lower depressive symptoms according to [Savage and Bailey \(2004\)](#). In this regard, [Raschick and Ingersoll-Dayton \(2004\)](#) find that adult children, as caregivers, experience more rewards than spousal caregivers. They suggest that spouses perceive informal care as a duty while adult children see it as social expectations. Additionally, married caregivers are less likely to be impacted negatively by the care process than unmarried caregivers ([Brody et al., 1995](#)), probably because they benefit from spousal support.

Other studies have found a positive effect of caregiving on health. [Cohen et al. \(2002\)](#) as well as [Ashworth and Baker \(2000\)](#) highlight beneficial aspects of caring such as personal development, satisfaction with helping others, strengthening the relationship with the care recipient ([Boerner et al., 2004](#)). According to [Braithwaite \(2000\)](#), a close and loving relationship between caregivers and care recipients is associated with lower psychiatric symptoms.

All these studies deal with effects on carers but providing informal support have implications not only for carers' health but also for their family. Caring for elderly is likely to affect the well-being of caregivers and their family members, especially when care recipients are members of the household ([Amirkhanyan and Wolf, 2006](#)). [Bookwala \(2009\)](#) focuses on the carers' couple and show that experienced caregivers are less happy in their marriages. Using marital role inequity as a measure of marital quality, the author performs a series of mixed multivariate analyses of covariance comparing the marital role inequity among different groups, namely former, recent and experienced caregivers. Despite very interesting results, they cannot conclude on the causal relationship between the intensity of help and the marital quality of caregivers' couple. To the best of our knowledge, Bookwala's work is the only study that pays attention to the effect of informal care provision on caregivers' couple.

This paper attempts to fill this gap in the literature by extending the previous findings about the impact of care provision on caregivers' health to their partners. More precisely, we study the causal relationship between informal care provision and the mental health of caregivers' partners using panel data from the Survey of Health, Ageing and Retirement (SHARE). The explained variable accounts for depressive symptoms related to one's mental health such as sadness, suicidability or irritability. We control for several characteristics concerning both the caregiver and her partner. We also use a Two-Stage-Least-Squares (2SLS) with instrumental variables approach in order to control for

the potential endogeneity issue due to the reverse causality between the care provided and the depressive state of the partner. The informal care provision is instrumented with the distance between adult childrens' and their parents' household and the number of sisters of the potential caregiver.

We contribute to the literature by empirically estimating whether care provision by adult children also affects their partners' depressive state while controlling for endogeneity. We attempt to go further by exploring the channels that might explain our results. More precisely, we examine the influence of caregiving on adult childrens' depressive state and the role of parental health as underlying mechanisms of the causal relationship between caregiving and partners' mental health.

We find that a higher frequency of caregiving leads to a lower depression rate of adult childrens' partners. Although parental health impacts the partner's depression negatively, it does not conflate with the effect of care provision. As it does not interfere in the causal relationship between care and mental health, we conclude that this channel does not appear to be convincing. However, our results may be partly explained by the second channel we attempt to explore: depressive state spillovers within the couple. Looking at gender separately, we find that adult men's depressive state is impacted negatively by their decision to care, as it is for their partners, highlighting the spouses' depressive state correlation. In brief, adult men's and their partners' depression rate are similarly affected by caregiving.

The rest of the paper is organized as follows. The empirical strategy is explained in Section 2. Section 3 presents the data and the sample selection as well as summary statistics. The main results are reported in Section 4. A discussion on the different channels that could explain our results is provided in Section 5. Section 6 presents robustness tests and Section 7 concludes.

2 Empirical strategy

Let us consider an individual i ($i=1,\dots,n$) who is in a couple with individual j ($j=1,\dots,n$). The subscript t stands for the periods of time. We measure the depression of individual i (D_{it}) which is a function of the care provided by individual j (C_{jt}) and two vectors of socio-demographic controls (\mathbf{Z}_{it}) for individual i and (\mathbf{X}_{jt}) for individual j . λ_t is a year fixed effect and α_k is a country fixed effect. The error component (ϵ_{it}) is clustered at the individual level. This equation is estimated using a standard linear regression such that:

$$D_{it} = \beta_0 + \beta_1 C_{jt} + \beta_2 \mathbf{Z}_{it} + \beta_3 \mathbf{X}_{jt} + \lambda_t + \alpha_k + \epsilon_{it} \quad (1)$$

However, this simple model may be biased due to different endogeneity issues. First, we suspect the main variable, Care (C_{jt}), to be endogenous due to the reverse causality bias. The decision to provide care and the depression of caregivers' partners may be simultaneously determined. The caregiving frequency is likely to be taken in a function of the depressive state of the partner: adult children may dedicate less time to care for their parents if they are in partnership with depressed people. In order to test whether Care (C_{jt}) is actually exogenous, we perform an augmented regression test. This method consists in including the residuals of endogenous variables as a function of exogenous variables, in the baseline model (Davidson and Mackinnon, 1992). We then test for the statistical significance of the coefficient on the residuals using a t-test¹. We reject the null hypothesis of exogeneity at 1% level and conclude that Ordinary Least Square (OLS) estimator is inconsistent.

Secondly, there are unobserved variables influencing depressive state of the partner that are correlated with the care provision. For instance, characteristics of the partner's family such as mental health history of the partner's parents are likely to impact both the depressive state of the partner and the care provided by adult children to his own parents. More specifically, the fact that partners are affected by their parents' mental health, leading to a higher depression score, impacts also the adult children's decision to care.

To tackle these two issues, we perform a second model using 2SLS with instrumental variables. The matter of concern with this methodology is to find instruments for the endogenous variable. In order to get unbiased estimates, instruments are required to be strong predictors of caregiving but uncorrelated with the residuals.

Past work has shown that the number of children, and particularly the number of daughters, is strongly correlated with the informal care provision. A large number of studies point out that daughters are the primary caregivers (Stone *et al.*, 1987; Norton, 2000; Coe *et al.*, 2013) meaning that a higher number of daughters increases the probability of being cared.

Other studies put forward the distance between children's and parents' households as a well-fitted instrumental variable for the informal care supply (Stern, 1995; Bonsang, 2009; Barnay and Juin, 2016). While the distance seems to be a strong predictor of informal care, the property regarding the independence of instrumental variables from the error term may fail. For instance, children could choose to move on closer to their parents when their health deteriorates. However, Charles and Sevak (2005) show that children location does not endogenously respond to parents' health. Another threat to the exogene-

¹ Detailed results are in Appendix, see Table A1.

ity is that this instrument may be correlated with the depression of the partner through another channel than the care provision. For instance, the distance between adult childrens' and parents' households is likely to affect the depression of the partner via the geographical location of the partner's parents. Especially, it would be the case if the adult childrens' parents live far away from the ones of her partner. Although the exogeneity of the variable regarding distance is questionable, we choose to consider it as it passes the test of overidentification (see below).

We tested other instruments for informal care including the number of brothers, the number of grandchildren and their age². In our estimations, however, these instruments are poorly correlated with informal care and hardly pass the overidentification test.

3 Data

Our estimations are done using the SHARE (Survey of Health, Ageing and Retirement in Europe) database. It is a multidisciplinary and cross-national survey that gathers more than 140,000 individuals over the age of 50 (and their partners) from 28 participating countries. The database provides information on health, socio-economic status and both social as well as family networks. Seven waves are now available. [Malter and Börsch-Supan \(2013, 2015, 2017\)](#) provide more information on data collection procedure and methodological issues.

3.1 Sample selection criteria

In our analyses, we consider informal care provided by adult children to their old-age parents. In order to be eligible for our sample, these adult children have to be in a partnership. Their partners are also interviewed, irrespective of age.

Couples living in co-residency with parents are not considered since we look at the care provided outside the household. This is not a worrying restriction. Even though co-residency is a source of informal care, restricting the sample to those who are not living with their own parents allows us to control for joint production. If caregivers and care recipients live together, two effects have to be distinguished: the help provided due to poor health and the help provided due to cohabitating. [Van Den Berg and Spauwen \(2006\)](#) point out the issue of joint production in the informal care process and show that doing different

² [Cox and Stark \(2005\)](#) question whether the presence of a child increases the quantity of services provided by adult children to their elder parents. They show that grandchildren could be a strong predictor of informal care.

tasks simultaneously would bias the real time caregivers dedicate to care.

Our sample comprises couples across nineteen European countries: Austria, Belgium, Croatia, Czechia, Denmark, Estonia, France, Germany, Greece, Israel, Italy, Luxembourg, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland, The Netherlands in waves 4, 5 and 6 of the survey. We do not use data from Hungary because information for waves 5 and 6 was not available. We choose not to focus on waves 1 and 2 because useful information was not available for a large part of the countries.

Additionally, adult children are 50 or older which meaning that their parents are even older and more at risk of dependency. Restrictions mentioned above constitute an observation panel of 12090.

3.2 Variables of interest

We aim at estimating the effect of informal care by adult children on their partners' depressive state. The dependent variable (D_{it}) is a discrete ordinal variable scored from 0 (not depressed) to 12 (very depressed) that represents whether partners have felt depressed in the last month. We use a generated variable provided by SHARE that represents the depression of each individual at each period of time by considering twelve items: feeling sad or depressed, hopes for the future, suicidal feelings, feeling guilty, sleeping troubles, interest in things, irritability, appetite, feeling tired, concentration, enjoyment and tearfulness. Each one out of the twelve items has the same weight and the sum of the answers to these questions gives a depression score rated on a scale of 0 to 12. Combining the identifier module of the survey, that allows us to link household members in a given wave, and the depression score of all interviewed individuals, we are able to obtain the partner's depression score.

The main explanatory variable (C_{jt}) is the informal care provided by adult children to either her mother or her father or both in the last twelve months. From information on the decision of caregiving and its frequency, a unique variable is built which gives the informal care frequency provided. For this variable, five categories are possible (no care provided, less often, almost every month, almost every week, almost daily) scored from 0 to 4. In these waves of the survey, personal care and practical household help are the two types of help considered.

Further explanatory variables regarding adult children are denoted by \mathbf{X}_{jt} and include age, gender, education, current job situation, wealth, number of hours worked, number of alive siblings, number of alive children and grandchildren³. \mathbf{Z}_{it} contains partner's characteristics such as education, current job

³ Wealth is the household net worth. Children including natural children, those of partner, fostered,

situation and age.

Table 1 presents the individuals characteristics of our sample. Men represent 44% of the sample. Both age of adult children and their partners are categorical variables. Three categories are possible: under 60 years, between 60 and 69 years old and more than 70 years old. The mean age is 58 years old for adult children and almost 63 years old for their partners. Current job situation is denoted by dummies variables that contain information on whether individuals are in the labor force (employed, self-employed or unemployed) or not (retired, homemaker, sick or disabled). Around 60% of the sample is still working. Including paid or unpaid overtime, on average adult children work roughly 23 hours a week. As for the caregiving frequency, 72.6% of the sample does not provide any help to her parents. However, around 27% of the whole sample has declared to help, and almost 11.1% did it every week.

The depression score of partners is not really high with a mean of 1.95 (on a scale from 0 to 12). As shown in Table 2, more than 30% of the sample has selected items such as feeling sad or depressed, recent trouble sleeping or being irritable while only 4% of the sample have chosen suicidal feelings.

As for instruments, we consider the number of adults' sisters and the distance between childrens' and parents' households. SHARE provides information about geographical proximity of children from parents. If parents live separately, we consider the one who lives the farthest from children. Indeed, living far away from parents' home, compared to residing in the same neighbourhood, may have a stronger negative impact on the caregiver's couple as it is more time-consuming and implies higher travel costs. Eight different categories are defined⁴: in the same building, less than 1 km away, between 1 and 5 km, between 5 and 25 km, between 25 and 100 km, between 100 and 500 km or more than 500 km. We consider the center of the bandwidth of each category. On average, adult children live 73.8 kilometers away from their parents' household.

Regarding the second instrumental variable, we focus on the number of adults' sisters rather than looking at the proportion of sisters⁵. The latter gives us less information about the intensity of caregiving: the proportion of sisters takes the same value whether the potential caregiver has one sister and no

adopted and stepchildren. Grandchildren including those of partners.

⁴ The category concerning children living with parents in the same household is excluded since we focus on the help provided outside the household.

⁵ We compare two IV regressions, using the number of sisters and the proportion of sisters. The F-test of excluded instruments with the number of sisters is higher than the one with the proportion. We also compare the overidentification test of all instruments and we find that the p-value is higher when using the number of sisters. As the null hypothesis is that instruments are valid, we conclude that the set of instruments considering the number of sisters is less likely to be endogenous.

Table 1: Sample summary statistics

Variables	Mean	Std. Dev.
<i>Adult children variables</i>		
Care (%)		
No care	72.60	
Less often	4.04	
Almost monthly	6.63	
Almost weekly	11.02	
Alsmot daily	5.71	
Age	58.24	5.23
50 - 60	62.42	
60 - 69	35.09	
> 69	2.50	
Marital status (%)		
Married, living with spouse	91.68	
Registered partnership	2.22	
Never married	2.21	
Divorced	3.34	
Widowed	0.55	
Depression	2.01	2.03
Men	0.44	0.5
Siblings	2.39	1.72
Year of education	12	4.23
In the labor force	0.6	0.49
Hours worked	22.95	20.96
<i>Partners variables</i>		
Depression of partner	1.94	2.02
Age of partner	62.94	7.03
< 60	31.84	
60 - 69	51.09	
> 69	17.07	
Year of education of partner	11.97	4.3
Partner in the labor force	0.59	0.49
<i>Household variables</i>		
Wealth	36.05	54.04
Children	3.43	2.16
Grandchildren	1.63	2.26
<i>Instruments</i>		
Distance	73.73	152.41
Number of sister	1.21	1.19
<i>N</i>	12090	

brother or four sisters and no brother, while the probability of caring is much higher in the first case.

Table 2: Decomposition of the depression score

Variables	Percent	Std. Dev.
Sad or depressed	0.35	0.48
Sleep	0.31	0.46
Irritability	0.31	0.46
Fatigue	0.28	0.45
Tearfulness	0.21	0.41
Concentration	0.13	0.34
Pessimism	0.11	0.32
Enjoyment	0.09	0.28
Guilty	0.08	0.27
Interest	0.06	0.23
Appetite	0.05	0.22
Suicidality	0.04	0.2
<i>N</i>	12090	

4 Estimation results

Table 3 presents our estimation results. All specifications include country and time fixed effects, and standard errors are clustered at the individual level in order to account for the dependency of observations. In the first column, we show the results from the OLS regression on depression of the partner treating *informal care as exogenous*. Informal care is associated with a positive but insignificant effect on partner’s depression. This suggests that the provision of informal care has no impact on the partner’s depression. Regarding individual characteristics, partner’s depressive state is higher when adult children are men. Wealth of the household decreases the depression of partners. Assuming exogeneity of informal care by adult children suggests that a higher intensity of care has no effect on the depression of the caregiver’s partner. However, these estimates may be biased due to endogeneity.

The second column of Table 3 presents the 2SLS⁶ with instrumental variables, treating *informal care as endogenous*. In this case, informal care is associated with a negative and significant effect ($p < 0.01$) on the partner’s depression. In other words, a higher intensity of care leads to a lower depressive state of the partner. Regarding partners’ characteristics, the depression score is lower among both high educated, older and wealthy individuals as well as those in

⁶ The first stage of the 2SLS regression, reported in the Appendix (see Table B1) shows that the first condition of the model is held.

the labor force. As for other variables, being a man or having grandchildren increases the depression score of the partner.

The reliability of the 2SLS results depends on the strength of the instruments. Considering the full sample, the F-test of the excluded instruments prove that these are valid as they are strongly correlated with the endogenous regressor ($F = 341.57$, $p < 0.01$). Given that there are two instruments for one endogenous regressor, testing overidentification is necessary to be sure that instruments are exogenous and not correlated with the error term. The model passes the test of overidentifying restrictions. The null hypothesis stating that instruments are valid is not rejected and means that the instruments are uncorrelated with the error term ($\chi^2_1 = 0.17$; $p = 0.67$).

Looking at gender separately, it is worth noting that men's partners are much more impacted by the care provision than women's ones ($0.528 > 0.194$). Both the F-test of excluded instruments ($F = 102.29$, $p < 0.01$; $F = 246.86$, $p < 0.01$) as well as the overidentification test ($p = 0.65$; $p = 0.28$) confirm the exogeneity of the instruments.

To sum up, while the first specification exhibits an insignificant effect of caregiving on the partner's depression, the use of instrumental variable approach, with reliable instruments, shows that the coefficient of caregiving is significant and negatively correlated to depression. This suggests that a higher intensity of care provided by adult children leads to a smaller depression rate of their partners. These findings confirm our intuition that informal care by adult children not only has an impact on the carer herself but also on her family and especially, on her partner. More specifically, our instrumental variable estimates tend to be in the stream of the literature that found a positive effect of help on carers' mental health (Cohen *et al.*, 2002; Ashworth and Baker, 2000).

Table 3: The impact of care provision on the partner's depressive state

	OLS	2SLS		
	Full	Full	Men (adult children)	Women (adult children)
<i>Adult children variables</i>				
Care	0.006 (0.01)	-0.301*** (0.09)	-0.528** (0.22)	-0.194** (0.09)
Men	0.650*** (0.04)	0.558*** (0.05)		
Age				
50-60				
60-70	-0.178*** (0.05)	-0.157*** (0.05)	-0.186** (0.09)	-0.123* (0.07)
70-90	0.130 (0.15)	0.102 (0.15)	-0.000 (0.25)	0.157 (0.17)
Marital status				
Married, living with spouse				
Registered partnership	0.098 (0.13)	0.068 (0.14)	0.174 (0.22)	-0.067 (0.18)
Never married	0.085 (0.13)	0.095 (0.13)	0.006 (0.19)	0.174 (0.19)
Divorced	0.192 (0.12)	0.218* (0.12)	0.470** (0.20)	0.044 (0.15)
Widowed	-0.093 (0.21)	-0.170 (0.23)	-0.261 (0.43)	-0.123 (0.26)
Siblings	0.006 (0.01)	-0.013 (0.01)	-0.013 (0.02)	-0.014 (0.02)
Education	-0.009 (0.01)	-0.007 (0.01)	-0.012 (0.01)	-0.001 (0.01)
Labor force	-0.088 (0.09)	-0.037 (0.09)	-0.210 (0.18)	0.062 (0.11)
Hours worked	0.000 (0.00)	-0.001 (0.00)	0.003 (0.00)	-0.004 (0.00)
<i>Partners variables</i>				
Age of partner				
< 60				
60-70	-0.126** (0.05)	-0.099* (0.05)	-0.121 (0.08)	-0.081 (0.07)
70-90	-0.226*** (0.08)	-0.172** (0.09)	-0.124 (0.16)	-0.190* (0.10)
Education of partner	-0.023*** (0.01)	-0.024*** (0.01)	-0.023** (0.01)	-0.024*** (0.01)
Partner in labor force	-0.373*** (0.05)	-0.368*** (0.05)	-0.422*** (0.08)	-0.316*** (0.06)
<i>Household variables</i>				
Children	0.007 (0.01)	0.006 (0.01)	0.011 (0.02)	0.003 (0.01)
Grandchildren	0.026** (0.01)	0.021* (0.01)	0.000 (0.02)	0.032** (0.01)
Wealth	-0.001*** (0.00)	-0.001*** (0.00)	-0.001** (0.00)	-0.001** (0.00)
Constant	1.776*** (0.11)	1.976*** (0.13)	2.709*** (0.21)	1.802*** (0.15)
Time fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Observations	12090	12090	5361	6729
F-test of excluded instruments		341.57***	102.29***	246.86***
Overidentification test		0.17 ($p=0.67$)	0.20 ($p=0.65$)	1.18 ($p=0.28$)
Underidentification test		501.47***	168.99***	334.19***

The sample includes 9609 individuals. Standard errors are in parentheses, clustered at the individual level.* $p<0.10$, ** $p<0.05$, *** $p<0.010$.

5 Informal care and caregivers partners' depressive state: the channels

We attempt to go further in explaining the positive impact of informal care provision on the partner's depression by exploring two channels: the role of parental health and spillover effects inside the couple.

5.1 Caregiving effect vs family effect

A first argument that may explain the positive effect of informal care provision on the partner's depression is the role of parental health status. The latter may represent an important explanation of partners' depressive state. For instance, they may be more or less depressed depending on the health status of their parents-in-law. According to [Barnay and Juin \(2016\)](#), informal care improves the old-age relatives' mental health contrary to formal care. More precisely, it reduces the risk of depression for the disabled elderly. Caregivers' partners could be impacted by caring activities positively because they witness an improvement of the health of their parents-in-law or at least, they are concerned by their well-being. Not taking this into account at all is likely to affect our results since the effect of parental health may be attributed to the care effect. In other words, the positive effect of care on partners' depression we have observed in the main regression may include the effect of parental health.

Nevertheless, we cannot measure the parental health improvement with our data due to both the high level of attrition and a too short time period. In this paper, only three waves are considered, and we cannot follow enough individuals whose parents are alive, through more than one or two waves.

According to [Bobinac *et al.* \(2010\)](#), one can identify two effects of having old-age parents in need: the caregiving effect and the family effect. The first one refers to either the positive or the negative effects on the caregiver due to help activities; as mentioned above, literature has already shown that caregiving is physically and mentally challenging. The second effect is related to the fact that people are directly influenced by their close relatives' health, whether or not they provide care. More precisely, witnessing regularly parents' mental and physical impairments may produce negative feelings for their children. These authors use the health of the care recipient as a proxy of the family effect and hypothesize a positive impact on the subjective well-being of the caregiver.

In order to disentangle the caregiving effect from the role of parental health, we follow [Bobinac *et al.* \(2010\)](#) procedure by estimating the 2SLS with instrumental variables including the health of care recipients, namely the parents.

The first three columns of Table 4 show the results. Comparison of these new results to the baseline ones shows that the coefficient of caregiving is still significant ($p < 0.01$) and of the same sign. This reveals that the family effect is not conflated with the caregiving effect and adding the health of parents does not impact the main results of the analysis but make them more precise and reliable. The coefficient of the parental health is positive which proves that partners are more depressed when their parents-in-law have a poor health status. These results are in line with those of [Bobinac *et al.* \(2010\)](#) who find a positive relationship between subjective well-being and health of care recipient.

Thus far, we have disentangle the effect of care from the one of parental health. However, despite interesting results, we conclude that parental health probably does not explain the positive impact care has on partner's depression as it does not interfere in this causal relationship.

5.2 Follow-up depressive symptoms inside the couple

Another argument that may explain our results is the depressive state spillovers within the couple. The positive effect of caregiving on the caregiver's health through channels such as enjoyment, companionship, fulfillment, could be directly reflected in the partner's health. [Siegel *et al.* \(2004\)](#) find that having a spouse with depressive symptoms is associated with "higher follow-up depressive symptoms" in the partner. People living together with sad or depressed partners are more likely to become depressed themselves. By contrast, we can suspect that caregivers' partners are less depressed because caregivers are themselves less depressed due to caring activities.

We explore this channel by estimating 2SLS with instruments using a new dependent variable: the depressive state of the caregiver. The reason for doing so is that both the depressive state of the partner and the one of the caregiver might follow the same trend.

The last three columns of Table 4 show the results using the depression of adult children as the explained variable. Considering the full sample, a high frequency of care provision leads to a smaller depression rate. Adult men are impacted by the informal care provision positively while women are not. However, it is worth noting that p-values of the overidentification tests for both full and women samples are highly significant. This means that the instruments are not strictly exogenous due to the correlation with the error term leading to biased results.

Men subsample is the only case where instruments are valid. However, the result for care is not very strong ($p < 0.1$) and depressive symptom spillovers do not appear to be fully convincing as the single explanation, highlighting the

existence of another black-boxed channel.

6 Robustness tests

In order to test the validity of our results, we perform a series of robustness tests⁷. We look at a different measure of care as well as at other dependent variables. Then, we test the robustness of our results by taking into account the potential caregiving episode of the partner.

6.1 Alternative measure of care and dependent variables

Our initial dependent variable is a depression score rated on a scale from 0 to 12. We check whether choosing different measures of depression, and more generally, of well-being is likely to affect our results.

First, we test a binary measure of the depressive state, assigning 1 to individuals that had a score higher than 4 on our initial scale. We estimate a linear probability model. The results presented in the first column of Table 5 show that using a binary measure of the depressive state does not affect the overall impact of the care provision, even though the size of the coefficient has slightly decreased compared with our initial specification ($0.301 > 0.033$).

Then, we control whether our results are sensitive to the use of another mental health measure, such as the life satisfaction. We use a generated variable provided by SHARE that represents the life satisfaction of each individual at each period of time, scored from 0 (completely dissatisfied) to 10 (completely satisfied). As with the depression variable, we are able to link household members due to the identifier module of the survey which allow us to obtain partners' life satisfaction scores. Based on the hypothesis that lower depression scores lead to a higher life satisfaction level, our results hold using this second specification, as shown in column 2 of Table 5. In other words, the more care adult children provide, the more satisfied their partners are. However, it is worth noting that partners' life satisfaction does not appear to be impacted by adult children gender while all other specifications point out that partners are more depressed when adult children are men.

In a third specification, we are interested in the measure of the care provision. Instead of using a frequency variable scored from 0 (no care provided) to 4 (care provided almost daily) as we did initially, we test the extensive margin with a binary measure of whether adult children provide care or not in the last twelve months. The results, presented in column 3 of Table 5, show that using

⁷ All first stages of 2SLS performed in this section are in Appendix, see Table B2.

Table 4: The impact of care provision on both the partner's and the adult child's depressive state including parental health.

Gender of adult children	Depressive state of partner			Depressive state of adult children		
	Full	Men	Women	Full	Men	Women
<i>Adult children variables</i>						
Care	-0.295*** (0.09)	-0.515** (0.22)	-0.190** (0.09)	-0.203** (0.10)	-0.331* (0.18)	-0.153 (0.11)
Parental health	0.146*** (0.02)	0.116*** (0.04)	0.163*** (0.03)	0.236*** (0.02)	0.191*** (0.03)	0.270*** (0.03)
Men	0.559*** (0.05)			-0.743*** (0.05)		
Age						
50-60						
60-70	-0.160*** (0.05)	-0.183** (0.09)	-0.131** (0.07)	-0.224*** (0.05)	-0.279*** (0.07)	-0.193** (0.08)
70-90	0.097 (0.15)	0.001 (0.25)	0.145 (0.17)	-0.219 (0.14)	-0.150 (0.21)	-0.255 (0.18)
Marital status						
Married, living with spouse						
Registered partnership	0.072 (0.14)	0.186 (0.22)	-0.075 (0.18)	0.093 (0.13)	0.059 (0.15)	0.131 (0.21)
Never married	0.082 (0.14)	0.000 (0.20)	0.153 (0.19)	0.186 (0.13)	0.287* (0.17)	0.019 (0.19)
Divorced	0.199 (0.12)	0.453** (0.20)	0.026 (0.15)	0.327*** (0.12)	0.229 (0.16)	0.447** (0.18)
Widowed	-0.193 (0.23)	-0.306 (0.43)	-0.125 (0.26)	0.175 (0.28)	-0.431 (0.32)	0.569 (0.37)
Siblings	-0.015 (0.01)	-0.015 (0.02)	-0.014 (0.02)	0.005 (0.01)	0.012 (0.02)	-0.001 (0.02)
Education	-0.006 (0.01)	-0.011 (0.01)	-0.001 (0.01)	-0.011* (0.01)	-0.002 (0.01)	-0.015* (0.01)
In the labor force	-0.030 (0.09)	-0.204 (0.17)	0.069 (0.11)	-0.367*** (0.10)	-0.673*** (0.15)	-0.169 (0.12)
Hours worked	-0.001 (0.00)	0.003 (0.00)	-0.003 (0.00)	-0.002 (0.00)	0.005 (0.00)	-0.007** (0.00)
<i>Partners variables</i>						
Age of the partner						
< 60						
60-70	-0.108** (0.05)	-0.130 (0.08)	-0.091 (0.07)	-0.109** (0.05)	-0.107 (0.07)	-0.079 (0.08)
70-90	-0.188** (0.09)	-0.138 (0.16)	-0.204** (0.10)	-0.144* (0.09)	-0.329** (0.13)	-0.059 (0.12)
Education of partner	-0.022*** (0.01)	-0.023** (0.01)	-0.022*** (0.01)	-0.017*** (0.01)	-0.013 (0.01)	-0.021** (0.01)
Partner in the labor force	-0.363*** (0.05)	-0.422*** (0.08)	-0.307*** (0.06)	-0.029 (0.05)	-0.098 (0.07)	0.048 (0.07)
<i>Household variables</i>						
Children	0.006 (0.01)	0.011 (0.02)	0.004 (0.01)	0.017 (0.01)	0.038** (0.01)	-0.003 (0.02)
Grandchildren	0.022** (0.01)	0.000 (0.02)	0.033** (0.01)	0.029** (0.01)	0.016 (0.02)	0.040*** (0.02)
Wealth	-0.001*** (0.00)	-0.001** (0.00)	-0.001** (0.00)	-0.001*** (0.00)	-0.001*** (0.00)	-0.002*** (0.00)
Constant	1.422*** (0.14)	2.262*** (0.24)	1.189*** (0.16)	1.589*** (0.14)	0.900*** (0.20)	1.542*** (0.19)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12090	5361	6729	12090	5361	6729
F-test of first-stage	345.40***	102.81***	249.69***	345.39***	102.81***	249.69***
Overidentification test	0.16 (<i>p</i> =0.69)	0.25 (<i>p</i> =0.62)	1.29 (<i>p</i> =0.25)	6.33 (<i>p</i> =0.01)	0.39 (<i>p</i> =0.53)	6.44 (<i>p</i> =0.01)
Underidentification test	506.35***	170.22***	336.56***	506.35***	170.22***	336.56***

the extensive margin does not affect our conclusion about the negative impact of care on partners' depressive state. However, the size of care coefficient has increased significantly with a value of almost 1, meaning that caring for old-age parents might decrease partners' depression score by one point on a scale rated from 0 to 12.

6.2 Alternative sample, using cross-sectionnal data

The previous analysis does not take into account the potential caregiving episodes of partners. Initially, we looked at the adult child caregiving activity and its impact on the partner's depressive state, disregarding whether the partner is also a caregiver. However, it could bias our estimations since it gets difficult to disentangle the effect of caregiving by adult children on their partners' depressive state from the one of caregiving by partners on their own depressive state.

Unfortunately, waves 4 and 5 of SHARE do not provide any information about the care provided by the partner: only one out of the two members of the couple answers the question "in the last twelve months, have you personally given personal care or practical household help to a family member living outside your household, a friend or neighbour ?" However, the sixth wave includes this information and both members of the couple are interviewed about the care they have provided. Using cross-sectional data from this wave, we look at the effects of caregiving on the partner's depressive state but we exclude couples whose both members are caregivers.

The last column of Table 5 reports the results from the 2SLS specification using cross-sectional data from wave 6 of the survey. Overall, it suggests that a higher intensity of care lead to a lower depressive state of the partner. However, it has to be noticed that both the size and the significance of the coefficient have decreased compared with our main specification.

Table 5: Robustness tests for alternative specifications.

	2SLS			
	Binary depression	Life satisfaction	Extensive margin	Cross sectional
<i>Adult children variables</i>				
Care	-0.033** (0.01)	0.183*** (0.07)		-0.201* (0.12)
Extensive			-0.988*** (0.30)	
Men	0.067*** (0.01)	0.014 (0.04)	0.556*** (0.05)	0.598*** (0.07)
Age				
50-60				
60-70	-0.026*** (0.01)	0.158*** (0.04)	-0.161*** (0.05)	-0.171** (0.07)
70-90	-0.011 (0.02)	0.066 (0.11)	0.099 (0.15)	0.239 (0.19)
Marital status				
Married, living with spouse				
Registered partnership	-0.005 (0.02)	-0.121 (0.10)	0.059 (0.14)	-0.048 (0.16)
Never married	-0.000 (0.02)	-0.126 (0.11)	0.115 (0.14)	0.208 (0.17)
Divorced	0.025 (0.02)	-0.256*** (0.09)	0.208* (0.12)	0.073 (0.14)
Widowed	-0.063** (0.03)	0.017 (0.21)	-0.162 (0.24)	-0.139 (0.28)
Siblings	-0.002 (0.00)	0.010 (0.01)	-0.015 (0.01)	-0.008 (0.02)
Education	0.000 (0.00)	0.017*** (0.00)	-0.004 (0.01)	-0.011 (0.01)
In the labor force	0.000 (0.01)	0.075 (0.07)	-0.012 (0.10)	-0.233* (0.13)
Hours worked	-0.000 (0.00)	0.002 (0.00)	-0.001 (0.00)	0.002 (0.00)
<i>Partners variables</i>				
Age of partner				
<60				
60-70	-0.009 (0.01)	0.027 (0.04)	-0.097* (0.05)	-0.117 (0.07)
70-90	-0.024* (0.01)	0.181*** (0.06)	-0.170* (0.09)	-0.292*** (0.11)
Education of partner	-0.003*** (0.00)	0.009** (0.00)	-0.023*** (0.01)	-0.028*** (0.01)
Partner in the labor force	-0.049*** (0.01)	0.225*** (0.04)	-0.365*** (0.05)	-0.375*** (0.07)
<i>Household variables</i>				
Children	-0.001 (0.00)	0.016** (0.01)	0.007 (0.01)	-0.006 (0.01)
Grandchildren	0.004** (0.00)	0.008 (0.01)	0.020* (0.01)	0.039*** (0.01)
Wealth	-0.000*** (0.00)	0.002*** (0.00)	-0.001*** (0.00)	-0.002*** (0.00)
Constant	0.143*** (0.02)	7.838*** (0.10)	1.962*** (0.13)	2.278*** (0.19)
Time fixed effects	Yes	Yes	Yes	No
Country fixed effects	Yes	Yes	Yes	Yes
Observations	12090	12090	12090	6274
F-test of first-stage	341.57***	341.57***	221.34***	237.42***
Overidentification test	0.18 (p=0.66)	0.42 (p=0.51)	0.13 (p=0.72)	1.06 (p=0.20)
Underidentification test	501.47***	501.47***	343.74***	344.65***

In the first three columns, the sample includes 9609 individuals and standard errors are in parentheses, clustered at the individual level. * p<0.10, ** p<0.05, *** p<0.010.

7 Conclusion

This paper analyses the impact of caregiving by adult children on their partners' depressive state. Using data from SHARE, we first use an OLS model estimating the effects of care provision on partners' depressive state among adult children aged 50 years old and over in nineteen European countries. As we suspect the main variable of interest to be endogenous, a second model is then estimated with 2SLS using the number of daughters and the distance between caregivers and parents as instruments. While the OLS specification exhibits a positive but insignificant effect of caregiving on depression, the use of instruments yields a significantly negative coefficient. This suggests that a higher intensity of care provided by adult children leads to a smaller depression rate of their partners.

We attempt to explore two channels that might explain our results: the role of parental health and the spillover effects inside the couple.

Considering the first one, it cannot be tested correctly due to data restriction. However, we take into account the family effect highlighted by [Bobinac *et al.* \(2010\)](#) in order to control for the impact of parents' health status on caregivers partners. Our results are in line with theirs showing that the care effect is different from the family one.

As for the second one, our findings show that adult men are also impacted by the informal care provision. This result may be consistent with our hypothesis of depressive state spillovers within the couple. However, despite interesting findings, the endogeneity of the instruments for two regressions out of three and the weakness of the significance level considering adult men lead us to conclude that spillover effects are only a partial explanation to our surprising results.

Limitations of this work constitute an obstacle to fully understand the puzzle. First, this study focuses on three waves. This prevents us from testing correctly the argument about the improvement of parental health. Additionally, some studies have analysed the long-term effect of providing care ([Bookwala, 2009](#)). The time period considered in this paper is too short to capture entirely the impact of caregiving and its follow-up symptoms. Secondly, we are not able to control for couples whose both members are caregivers in waves 4 and 5 due to data restrictions. Obviously, performing the same analysis with complete information regarding the care provision of both caregivers and their partners would strengthen the results.

Overall, this paper underlines the complexity of the relationship between informal care and mental health. Many studies have analysed the impact of informal care provision on mental health, limiting their work to caregivers. We attempt to go further and provide hints on the relationship between informal care and mental health of the partner suggesting that the consequences of caring

activities are more widespread than what the literature has shown so far.

Appendices

A Augmented regression test (DWH test)

Table A1 reports the results for the augmented regression test. The residuals of the endogenous variable have been including as a function of exogenous variables in the baseline model. The small p -value of the t-test indicates that OLS is inconsistent.

Table A1: Augmented regression using OLS and t-test of the residuals.

Dependent variables	OLS	
	Care	Depression of partner
Residuals		-0.316*** (0.09)
<i>Instruments</i>		
Distance	-0.001*** (0.00)	
Sisters	-0.037** (0.02)	
<i>Adult children variables</i>		
Care		0.015 (0.01)
Men	-0.310*** (0.03)	0.558*** (0.05)
Age		
50-60		
60-70	0.065** (0.03)	-0.157*** (0.05)
70-90	-0.082 (0.08)	0.102 (0.15)
Marital status		
Married, living with spouse		
Registered partnership	-0.071 (0.08)	0.068 (0.13)
Never married	0.045 (0.08)	0.095 (0.13)
Divorced	0.067 (0.07)	0.218* (0.12)
Widowed	-0.293** (0.13)	-0.170 (0.22)
Siblings	-0.030*** (0.01)	-0.013 (0.01)
Education	0.008** (0.00)	-0.007 (0.01)
In the labor force	0.172*** (0.06)	-0.037 (0.09)
Hours worked	-0.004*** (0.00)	-0.001 (0.00)
<i>Partners variables</i>		
Age of partner		
<60		
60-70	0.086*** (0.03)	-0.099** (0.05)
70-90	0.188*** (0.05)	-0.172** (0.09)
Education of partner	-0.001 (0.00)	-0.024*** (0.01)
Partner in the labor force	0.015 (0.03)	-0.368*** (0.05)
<i>Household variables</i>		
Children	-0.004 (0.01)	0.006 (0.01)
Grandchildren	-0.018*** (0.01)	0.021* (0.01)
Wealth	0.001** (0.00)	-0.001*** (0.00)
Constant	0.685*** (0.08)	1.976*** (0.13)
T-test of residuals: $(\chi_1^2) = 11.58$ ($p < 0.001$)		
Observations	12090	12090

The sample includes 9609 individuals. Standard errors are in parentheses, clustered at the individual level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.010$.

B First stages of 2SLS

Table B1 reports the results for both the first stage and the second stage of the 2SLS regression. The instruments, distance and sisters, are jointly significant in the endogenous variable (C_{jt}). The property regarding the strong correlation between instrumental variables and the endogenous regressor is confirmed.

Table B1: First stages of 2SLS of main specification.

	First stages		
	Full	Men (adult children)	Women (adult children)
<i>Instruments</i>			
Distance	-0.001*** (0.00)	-0.001*** (0.00)	-0.002*** (0.00)
Sisters	-0.037** (0.02)	-0.003 (0.02)	-0.063*** (0.02)
<i>Adult children variables</i>			
Men	-0.310*** (0.03)		
Age			
50-60			
60-70	0.065** (0.03)	0.000 (0.04)	0.115** (0.05)
70-90	-0.082 (0.08)	-0.136 (0.09)	0.048 (0.14)
<i>Marital status</i>			
Married, living with spouse			
Registered partnership	-0.071 (0.08)	-0.060 (0.10)	-0.066 (0.13)
Never married	0.045 (0.08)	-0.021 (0.10)	0.134 (0.13)
Divorced	0.067 (0.07)	0.087 (0.10)	0.044 (0.10)
Widowed	-0.293** (0.13)	-0.219 (0.16)	-0.332* (0.19)
Siblings	-0.030*** (0.01)	-0.032** (0.01)	-0.027 (0.02)
Education	0.008** (0.00)	0.009* (0.00)	0.010* (0.01)
In the labor force	0.172*** (0.06)	-0.003 (0.09)	0.251*** (0.08)
Hours worked	-0.004*** (0.00)	-0.002 (0.00)	-0.005*** (0.00)
<i>Partners variables</i>			
Age of partner			
<60			
60-70	0.086*** (0.03)	0.022 (0.04)	0.191*** (0.05)
70-90	0.188*** (0.05)	0.023 (0.07)	0.294*** (0.07)
Education of partner	-0.001 (0.00)	0.002 (0.01)	-0.003 (0.01)
Partner in the labor force	0.015 (0.03)	0.062 (0.04)	-0.015 (0.05)
<i>Household variables</i>			
Children	-0.004 (0.01)	-0.002 (0.01)	-0.005 (0.01)
Grandchildren	-0.018*** (0.01)	-0.015* (0.01)	-0.021** (0.01)
Wealth	0.001** (0.00)	0.000 (0.00)	0.001** (0.00)
Constant	0.685*** (0.08)	0.354*** (0.09)	0.660*** (0.12)
Time fixed effects	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes
Observations	12090	5361	6729

Standard errors are in parentheses, clustered at the individual level
 * p<0.10, ** p<0.05, *** p<0.010.

Table B2: First stages of 2SLS of alternative specifications.

	2SLS			
	Binary depression	Life satisfaction	Extensive margin	Cross sectional
<i>Instruments</i>				
Distance	-0.001*** (0.00)	-0.001*** (0.00)	-0.001*** (0.00)	-0.001*** (0.00)
Sisters	-0.037** (0.02)	-0.037** (0.02)	-0.037** (0.02)	-0.023 (0.02)
<i>Adult children variables</i>				
Men	-0.310*** (0.03)	-0.310*** (0.03)	-0.310*** (0.03)	-0.307*** (0.03)
Age				
< 60				
60-70	0.065** (0.03)	0.065** (0.03)	0.065** (0.03)	0.053 (0.04)
70-90	-0.082 (0.08)	-0.082 (0.08)	-0.082 (0.08)	-0.043 (0.10)
Marital status				
Married, living with spouse				
Registeredpartnership	-0.071 (0.08)	-0.071 (0.08)	-0.071 (0.08)	-0.040 (0.10)
Nevermarried	0.045 (0.08)	0.045 (0.08)	0.045 (0.08)	0.049 (0.10)
Divorced	0.067 (0.07)	0.067 (0.07)	0.067 (0.07)	-0.044 (0.09)
Widowed	-0.293** (0.13)	-0.293** (0.13)	-0.293** (0.13)	-0.219 (0.19)
Siblings	-0.030*** (0.01)	-0.030*** (0.01)	-0.030*** (0.01)	-0.037*** (0.01)
Education	0.008** (0.00)	0.008** (0.00)	0.008** (0.00)	0.013*** (0.00)
In the labor force	0.172*** (0.06)	0.172*** (0.06)	0.172*** (0.06)	0.189** (0.08)
Hours worked	-0.004*** (0.00)	-0.004*** (0.00)	-0.004*** (0.00)	-0.005*** (0.00)
<i>Partners variables</i>				
Age of partner				
< 60				
60-70	0.086*** (0.03)	0.086*** (0.03)	0.086*** (0.03)	-0.008 (0.04)
70-90	0.188*** (0.05)	0.188*** (0.05)	0.188*** (0.05)	0.101 (0.06)
Education of partner	-0.001 (0.00)	-0.001 (0.00)	-0.001 (0.00)	0.001 (0.00)
Partner in the labor force	0.015 (0.03)	0.015 (0.03)	0.015 (0.03)	0.015 (0.04)
<i>Household variables</i>				
Children	-0.004 (0.01)	-0.004 (0.01)	-0.004 (0.01)	-0.004 (0.01)
Grandchildren	-0.018*** (0.01)	-0.018*** (0.01)	-0.018*** (0.01)	-0.010 (0.01)
Wealth	0.001** (0.00)	0.001** (0.00)	0.001** (0.00)	0.000 (0.00)
Constant	0.685*** (0.08)	0.685*** (0.08)	0.685*** (0.08)	0.743*** (0.11)
Time fixed effects	Yes	Yes	Yes	No
Country fixed effects	Yes	Yes	Yes	Yes
Observations	12090	12090	12090	6274

In the first three columns, the sample includes 9609 individuals and standard errors are in parentheses, clustered at the individual level. * p<0.10, ** p<0.05, *** p<0.010.

Bibliography

- Lanzieri (2011). The greying of the baby boomers. a century-long view of ageing in european populations. *Eurostat: Statistics in focus, 23/2011*.
- Hirst, M. (2005). Carer distress: a prospective, population based-study. *Social Sciences and Medicine*, 61:697–708.
- Chappell, L. and Reid, R. (2002). Burden and well-being among caregivers: examining the distinction. *The Gerontologist*, 42:772–780.
- Cooper, C., Balamurali, T. B. S., and Livingston, G. (2007). A systematic review of the prevalence and covariates of anxiety in caregivers of people with dementia. *International Psychogeriatrics*, 19(2):175—195.
- Pinquart, M. and Sörensen, S. (2003). Associations of stressors and uplifts of caregiving with caregiver burden and depressive mood: a meta-analytic comparison. *Journal of Gerontology. Serie B, Psychological Sciences and Social Sciences*, 58(2):112–128.
- Schulz, R., Bookwala, J., O'Brien, A. T., and Kathy, F. (1995). Psychiatric and physical morbidity effects of dementia caregiving: prevalence, correlates and causes. *The Gerontologist*, 35:771–791.
- Pinquart, M. and Sörensen, S. (2007). Correlates of physical health of informal caregivers: a meta-analysis. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 62(2):P126–P137.
- Bobinac, A., Van Exel, N. J. A., Rutten, F. F., and Brouwer, W. B. (2010). Caring for and caring about: disentangling the caregiver effect and the family effect. *Journal of Health Economics*, 29:549–556.
- Savage, S. and Bailey, S. (2004). The impact of caring on caregivers' mental health: a review of the literature. *Australian health review : a publication of the Australian Hospital Association*, 27(1):111—117.
- Raschick, M. and Ingersoll-Dayton, B. (2004). The costs and rewards of caregiving among aging spouses and adult children. *Family Relations*, 53(3):317–325.
- Brody, E. M., Litvin, S. J., Hoffman, C., and Kleban, M. H. (1995). Marital status of caregiving daughters and co-residence with dependent parents. *The Gerontologist*, 35(1):75–85.

- Cohen, A. C., Colantonio, A., and Vernich, L. (2002). Positive aspects of caregiving: rounding out the caregiver experience. *International Journal of Geriatric Psychiatry*, 17:184–188.
- Ashworth, M. and Baker, H. (2000). Time and space: carers' views about respite care. *Health and Social Care in the Community*, 8:50–56.
- Boerner, K., Schulz, R., and Horowitz, A. (2004). Positive aspects of caregiving and adaptation to bereavement. *Psychology and Aging*, 19(4):668–675.
- Braithwaite, V. (2000). Contextual or general stress outcomes making choices through caregiving appraisals. *The Gerontologist*, 40(6):706–717.
- Amirkhanyan, A. A. and Wolf, D. A. (2006). Parent care and the stress process: findings from panel data. *The Journals of Gerontology: Series B*, 61(5):S248–S255.
- Bookwala, J. (2009). The impact of parent care on marital quality and well-being in adult daughters and sons. *The Journal of Gerontology*, 64B(3):339–347.
- Davidson, R. and Mackinnon, J. G. (1992). *Estimation and Inference in Econometrics*. Oxford University Press, USA.
- Stone, R., Cafferata, G. L., and Sangl, J. (1987). Caregivers of the frail elderly: a national profile. *The Gerontologist*, 27:616–626.
- Norton, E. (2000). Long-term care. pages 955–994.
- Coe, N. B., Harold Van Houtven, C. H., and Skira, M. M. (2013). The effect of informal care on work and wages. *Journal of Health Economics*, 32(1):240 – 252.
- Stern, S. (1995). Estimating family long-term care decisions in the presence of endogenous child characteristics. *The Journal of Human Resources*, 30(3):551–580.
- Bonsang, E. (2009). Does informal care from children to their elderly parents substitute for formal care in Europe ? *Journal of Health Economics*, 28:143–154.
- Barnay, T. and Juin, S. (2016). Does home care for dependent elderly people improve their mental health ? *Journal of Health Economics*, 45:149–160.

- Charles, K. K. and Sevak, P. (2005). Can family caregiving substitute for nursing home care? *Journal of Health Economics*, 24(6):1174–1190.
- Cox, D. and Stark, O. (2005). On the demand for grandchildren: tied transfers and the demonstration effect. *Journal of Public Economics*, 89(9-10):1665–1697.
- Malter, F. and Börsch-Supan, A. (2013). *SHARE Wave 4: Innovations & Methodology*. Munich: MEA, Max Planck Institute for Social Law and Social Policy (MPISOC).
- Malter, F. and Börsch-Supan, A., editors (2015). *SHARE Wave 5: Innovations & Methodology*. Munich: MEA, Max Planck Institute for Social Law and Social Policy (MPISOC).
- Malter, F. and Börsch-Supan, A. (2017). *SHARE Wave 6: Panel innovations and collecting Dried Blood Spots*. Munich: Munich Center for the Economics of Aging (MEA).
- Van Den Berg, B. and Spauwen, P. (2006). Measurement of informal care: an empirical study into the valid measurement of time spent on informal caregiving. *Health Economics*, 15(5):447–460.
- Siegel, M. J., Bradley, E. H., Gallo, W. T., and Kasl, S. V. (2004). The effect of spousal mental and physical health on husbands' and wives' depressive symptoms, among older adults: longitudinal evidence from the Health and Retirement Survey. *Journal of Aging and Health*, 16(3):398–425.
- Coe, N. and Van Houtven, C. H. (2009). Caring for mom and neglecting yourself ? The health effects of caring for an elderly parent. *Health Economics*, 18:991–1010.
- Schmitz, H. and Westphal, M. (2015). Short-and medium-term effects of informal care provision on female caregivers' health. *Journal of Health Economics*, 42:174–195.
- Mentzakis, E., McNamee, P., and Ryan, M. (2009). Who cares and how much: exploring the determinants of co-residential informal care. *Review of Economics of the Household*, 7(3):283–303.
- Di Novi, C., Jacobs, R., and Migheli, M. (2015). The quality of life of female informal caregivers: from Scandinavia to the Mediterranean Sea. *European Journal of Population*, 31(3):309–333.

- Trivedi, R., Beaver, K., Bouldin, E. D., Eugenio, E., Zeliadt, S. B., Nelson, K., Rosland, A.-M., Szarka, J. G., and Piette, J. D. (2014). Characteristics and well-being of informal caregivers: Results from a nationally-representative US survey. *Chronic Illness*, 10(3):167–179.
- Bolin, K., Lindgren, B., and Lundborg, N. (2008). Your next of kin or your own career? Caring and working among the 50+ of Europe. *Journal of Health Economics*, 27(3):718–738.
- Carmichael, F. and Charles, S. (2003). The opportunity costs of informal care: does gender matter? *Journal of Health Economics*, 22(5):781–803.
- Kotsadam, A. (2011). Does informal eldercare impede women’s employment? The case of European welfare states. *Feminist Economics*, 17(2):121–144.
- Leigh, A. (2010). Informal care and labor market participation. *Labour Economics*, 17(1):140–149.