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## **Until death tears us apart**

**Effects of formal home care on spousal health outcomes**

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## **Abstract**

The goal of this study is to examine the impact of formal home care on the spousal caregiver's physical and mental health. From a sample of 6.136 caregivers, who participated in the SHARE survey, 23% received formal home care. This project uses different methodologies: Ordered Probit regressions, Propensity Score Matching, and Fixed Effects estimation. The analysis revealed that formal home care has no impact on caregiver's physical and mental health, that male caregivers are more likely to benefit from it and seem to have a better overall experience. Also, the health status of the care receivers has a positive impact on caregiver's health.

**Keywords:** informal care, formal home care, home and community-based services, elderly.

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# 1 Introduction

Population aging is a worldwide phenomenon that poses unique challenges to governments and society. Over the last six decades, the share of the population aged 65 years and over almost doubled, representing 18.5% of the European population in 2017. From those, 45% have at least one disability. The increase in both life expectancy and number of years that people live with more or less severe disabilities translates into increasing demand for long-term care (LTC) that will have to be provided informally or by paid professionals (Bookwala, Yee, and Schulz 2002; Pinquart and Sörensen 2003a; Colombo et al. 2011).

In Europe as of now, most LTC is provided informally by family members (Wagner and Brandt 2018). Providing informal care may be detrimental to the caregiver's health (Do et al. 2015). Formal LTC, provided by paid professionals, may relieve caregivers. To design policies to minimize the negative effects of providing informal care, knowing the different LTC services' impacts on caregiver physical and mental health is crucial. Some studies find that formal LTC options influence positively overall well-being at the country level (Wagner and Brandt 2018).

This study contributes to informing LTC policymaking by answering the following question: "What is the impact of formal home care use on spousal health outcomes?". I compare the health outcomes of spouses who care for their partner by themselves with the health outcomes of those whose partner also receives formal home care, such as the provision of meals or help with personal grooming. I control for differences in the care receivers' needs and apply Propensity Score Matching (PSM) and fixed effects models to deal with endogeneity issues. I use data from the Survey of Health, Ageing and Retirement in Europe (SHARE) covering 27 European countries.

The thesis continues as follows. The following section discusses some of the relevant existing literature. Sections 3 and 4 go into the model, methodologies, and used data. Section 5

presents and discusses the results, and, finally, section 6 concludes and suggests further research.

## **2 Background and Literature Review**

Often, individuals with chronic conditions like diabetes, or who experienced an acute event like breaking their hip, need help in carrying out the Activities of Daily Living (ADL, e.g. eating or bathing) and/or the Instrumental Activities of Daily Living (IADL, e.g. taking medication or housekeeping) (Bookwala, Yee, and Schulz 2002; Haley et al. 2009; Nogueira 2009; Reaves and Musumeci 2015; Savage and Bailey 2004). Typically, they need help for long periods of time or even permanently (i.e. LTC).

There are different LTC settings: institutional care that includes nursing homes and residential care, and Home and Community-Based Services (HCBS), which includes daycare and mostly, home care. Home care may be provided formally (i.e. by paid professionals, e.g. meals-on-wheels, cleaning, laundry, personal care) or informally by a family member or a friend (Joël, Dufour-Kippelen, and Samitca 2010; Reaves and Musumeci 2015). Formal and informal home care may be complementary or substitute services, depending on the type and level of need (Lipszyc, Sail, and Xavier 2012; Nogueira 2009). That is, some formal home care users may require additional help from an informal caregiver, while in other cases formal home care may replace the need for informal care (Perdrix Elsa and Roquebert 2019).

LTC settings differ in their costs and different individuals prefer different settings. Care recipients and caregivers tend to prefer HCBS when care needs are relatively low. Furthermore, HCBS usually have lower cost per user than institutional care, without compromising patient outcomes, except for severe levels of need (Dong, Pollack, and Konetzka 2019; Grabowski 2006). The place where care is provided may also influence caregiver health, depending as well on the level of need of the care recipient.

Informal caregivers provide unpaid care for altruistic reasons, as they usually have a personal bond with the care receiver, because they feel that it is their duty, or because they expect a bequest (Nogueira 2009). There are several studies on the impacts of informal caregiving on caregiver health. Most studies conclude that providing care has harmful impacts on caregiver health, in both the short and the long term (Dong, Pollack, and Konetzka 2019), sometimes impeding the continuation of caregiving and leading to the institutionalization of the care receiver (Haley et al. 2009; Juin 2019). Caring for someone may lead to increased psychological distress and adverse physical health outcomes which can, ultimately, intensify caregiver's healthcare needs, medication use, and health expenditures (Do et al. 2015).

Caregiving may require, for example, lifting and transferring the care receiver. Compared to non-caregivers, caregivers report having more days of extreme effort (Bookwala, Yee, and Schulz 2002). This may result in physical pain, back problems, sleep disturbances, and a weaker immune system (Coe and Van Houtven 2009; Do et al. 2015; Pinquart and Sörensen 2003b; Schoenmakers, Buntinx, and Delepeleire 2010). Regarding mental health, depression, isolation, anxiety, affective disorders, and lower life satisfaction are often related to informal care provision (Bookwala, Yee, and Schulz 2002; Savage and Bailey 2004; Schoenmakers, Buntinx, and Delepeleire 2010). Moreover, feelings of uncertainty and burden are common among caregivers, as they don't know what the progression of the needs/health conditions will be (Pinquart and Sörensen 2003a). Caregiving may also restrict the caregiver's personal, social, and professional life, mainly if care is solely provided by the informal caregiver (Nogueira 2009; Pinquart and Sörensen 2003b). This has impacts on the caregiver's financial status and affects employers and, ultimately, society (Juin 2019).

Even though most studies find negative effects of providing care, caregiving may also be beneficial for caregiver physical and mental health. For example in the case of retired couples,

caregiving helps keeping individuals active, something positively associated with health. Enhanced self-esteem, appreciation for life, sense of satisfaction, fulfillment, pride, feeling needed and appreciated, and generally a more positive attitude towards life are potential benefits of providing care (Dong, Pollack, and Konetzka 2019; Haley et al. 2009; Brown et al. 2003; Pinqart and Sörensen 2003b). According to Haley et al. (2009), these factors may help caregivers cope with the stressful task of caregiving, who may not even shown any negative impacts (Pinqart and Sörensen 2003a).

On balance, caregiving may be good or detrimental for health, so it remains an empirical question. The literature provides different results also because studies focus on different groups of caregivers (e.g. spouses, children) and different types or varying degrees of intensity of help provided (Bookwala, Yee, and Schulz 2002; Colombo et al. 2011; Juin 2019; Schoenmakers, Buntinx, and Delepeleire 2010). Providing help for shorter or longer periods, as well as the type and severity of the illness or limitations of the care receiver also play a role (Pinqart and Sörensen 2006). The impact of providing care also depends on the gender of the care provider. For example, female caregivers spend more time helping with personal and household tasks and caregiving in general than males, and women are less likely to institutionalize their family members than men (Bookwala, Yee, and Schulz 2002; Pinqart and Sörensen 2006). Moreover, male caregivers are more likely to enjoy caregiving, while females may feel more burden and less self-esteem (Kim, Baker, and Spillers 2007).

Focusing on spouse caregivers is particularly important as they represent the bulk of caregivers and usually, they are older and at higher risk of having physical or mental health problems (Dong, Pollack, and Konetzka 2019). Compared with non-spousal caregivers, spousal caregivers report lower levels of satisfaction, positive affect, and well-being (Savage and Bailey 2004). They also have fewer resources to deal with stress, due to their advanced age (Pinqart

and Sørensen 2003b). After the death of the care recipient, the probability of being hospitalized and facing major negative life changes is significantly higher, as well as the probability of dying within five years after the death of the care receiver (Coe and Van Houtven 2009). While there are a few studies on the impacts of informal caregiving on (spousal) caregivers' health, there is virtually no literature on whether formal home care utilization may relieve caregiver burden and protect caregiver health, with the exception of Juin (2019). This is the focus of this study.

### **3 Methodology**

#### **3.1 Data and Sample**

This study uses SHARE data. SHARE is a multidisciplinary, cross-national panel database that includes representative samples of individuals 50 years and older and their partners irrespective of age, in 27 European countries and Israel. The survey is conducted every two years since 2004. This study uses the five waves where information regarding the use of formal home care is available: 2006/07, 2011, 2013, 2015, and 2017, covering 21 countries (not all countries are in all waves).

SHARE has couple identifiers, allowing the match of a care recipient to his or her spouse. A care recipient is defined as an individual who receives formal home care or any type of informal help, from the spouse or from someone else living inside or outside the household. In the main analyses in this study, a caregiver is defined as a spouse/partner who lives in the same house as a care recipient. A stricter definition is also considered in complementary analyses, where a spouse/partner is only considered a caregiver if he or she says that they provide informal help to their spouse. This distinction may be informative, as spouses may consider themselves informal caregivers or not depending on their perception of their spousal role/responsibilities, which may

be related for example with gender or culture.

The questions “Is there someone living in this household whom you have helped regularly during the last twelve months with personal care, such as washing, getting out of bed, or dressing?” and ”Who is that?” allow us to identify whether a respondent is a spouse caregiver or not. In addition, the question “In the last twelve months, have you received in your house any type of professional service or any paid service due to physical, mental, emotional or memory problem?” allows us to identify formal home care users. Couples with zero or more than one care receiver were dropped. After dropping also observations with missing values in the use variables, the sample used in the main analyses is composed of 6.136 caregivers, with 1.413 (23%) of the respective care recipients receiving also formal home care.

### 3.2 Empirical Model

To determine the impact of formal home care use on spousal health outcomes, the following model was used:

$$Health_i = \beta_0 + \beta_1.Anyhomecare_i + \gamma.C_i + \epsilon_i \quad (1)$$

The **dependent variable**,  $Health_i$ , is either physical or mental health of caregiver  $i$ . Mental health is measured using a depression scale, also an ordinal variable, that ranges between 0 (very depressed) and 12 (not depressed). The depression scale used is the EURO-D, adopted in different European countries; it contains items such as depression, pessimism, suicidality, guilt, etc. (Prince et al. 1999). Because of the relatively large number of levels, I treat the depression scale as continuous and estimate the model by Ordinary Least Squares (OLS). To measure physical health, I will use self-perceived health, an ordinal variable that ranges from 1 to 5, being 1 the lowest level (poor self-perceived health) and 5 the highest level (excellent

self-perceived health) (Ware and Gandek 1998). I estimate an Ordered Probit Model to take into account the ordinal nature of this variable, and OLS for comparison.

The variable of main interest,  $Anyhomecare_i$ , is dichotomous and takes value 1 if the care recipient receives formal home care (nursing or personal care, domestic help, or meals-on-wheels), and zero if she receives only informal help.

The vector  $C_i$  includes caregiver gender, age, education (International Standard Classification of Education – 97; ISCED 1997), employment status, and country of residence. The number of elements of the household is also included in the vector of controls, as well as wave fixed effects.

In a more complete specification, the vector  $C_i$  includes also partner (i.e. care recipient) characteristics, including depression scale and self-perceived health. Having a partner in poor health may harm (mental) health, irrespective of providing care or not. Partner health obviously affects the utilization of formal home care. So, it is crucial to control for the health status of the partner.

Finally, in some specifications, I controlled for the receipt of informal help from outside the household (e.g. from children), as well as the provision of help outside the household (e.g. taking care of grandchildren). Receiving informal help from other family members/friends may also relieve the spousal caregiver, while providing help to others outside the household may represent an extra burden. Both may be correlated with the receipt of formal home care, so it is important to control for this.

### **3.3 Endogeneity**

Overall, it may be difficult to control perfectly for the health status of the care recipient spouse, as well as other household characteristics and couple dynamics that may be related to

both caregiver health and formal home care use (e.g. preferences, health-related behaviors like smoking or diet, social network/support from family members outside the household).

Besides potentially important unobserved variables, there may be reversed causality from caregiver health to formal home care utilization: if the caregiver becomes ill, disabled, or depressed, the couple may be more likely to hire formal help. According to Juin (2019), the reverse causality issue may underestimate the positive effect of formal home care on caregiver's health.

This endogeneity of formal home care use needs to be addressed to identify the causal impact of formal home care on caregiver health. To deal with endogeneity, we tried an instrumental variable (IV) approach, that could solve both unobserved heterogeneity and reversed causality. The instruments considered were indicators of regional supply of formal LTC (e.g. number of formal home care providers or number of nursing home beds per person 65+ in the region). However, these instruments proved to be weak. So, to address endogeneity at least partly, we considered Propensity Score Matching and fixed effects models.

### **3.4 Propensity Score Matching**

The goal of Propensity Score Matching (PSM) is to compare a group of treated and a group of untreated individuals that have similar observable pretreatment characteristics (Caliendo and Kopeinig 2008). In this study, the objective is to compare the health outcomes of two caregivers with very close socioeconomic characteristics, that have partners with very similar health status, but where one benefits from formal home care and the other does not.

The observable characteristics considered are partner self-perceived health, depression scale, education, and age, the caregiver's own age, gender, education, and employment status, household size, country, and wave where the first answer was given.

PSM may enhance the comparability of treated and untreated individuals, but it will not solve the reverse causality issue or selection on unobservable, as the matching is done on observables. When analyzing the results, one must bear in mind this limitation.

### **3.5 Fixed Effects**

Controlling for individual fixed effects (FE) helps dealing with part of the unobservable characteristics that influence both caregiver health and formal home care use – the time-invariant part (Kaschowitz and Brandt 2017; Van Den Berg, Fiebig, and Hall 2014; Di Novi, Jacobs, and Migheli 2015). Still, fixed effects is not enough to solve completely the endogeneity issue.

Note that in the main analyses, where data are treated as cross-section, I only consider couples **in the waves** where (only) one of the members receives formal/informal home care. To estimate fixed effects models, I recovered the observations of included couples in the waves where no one is a care receiver (i.e. before the care receiver started to receive care or after he stopped receiving care). This naturally increased the sample size (but not the number of couples).

Knowing that FE cannot be applied in Ordered Probit Models, I estimate a FE Ordered Logit Model as proposed by Baetschmann, Staub, and Winkelmann (2015).

## **4 Empirical Results**

### **4.1 Descriptive Statistics**

Table 1 presents the descriptive statistics for both caregivers and care receivers. In each case, the first column contains information for couples that use formal home care and the second column contains information for the subsample where only informal care from/to the partner is

**Table 1: Descriptive Statistics**

	<b>Caregiver</b>		<b>Care Receiver</b>	
	Formal Home Care (N=1413)	Solo (N = 4723)	Formal Home Care (N=1413)	Solo (N = 4723)
<b>Gender (%)</b>				
Male	66,36	47,78	33,64	52,22
Female	33,64	52,22	66,36	47,78
<b>Age (Mean)</b>	69,00	66,00	69,00	66,00
<b>Education (%)</b>				
None	6,12	4,05	6,60	4,38
Primary	20,48	20,60	21,99	21,41
Lower secondary	14,95	18,24	16,12	17,45
Secondary	30,10	31,98	30,39	32,46
Post-secondary (non tertiary)	3,50	3,91	2,67	3,66
First stage of tertiary	22,86	20,36	20,63	20,65
Second stage of tertiary	1,60	0,53	0,68	0,55
<b>Employment status (%)</b>				
Retired	68,93	59,14	60,88	60,17
Employed	18,98	24,54	14,04	21,42
Unemployed	2,18	2,99	1,17	2,42
Permanently sick or disabled	2,09	10,28	9,57	5,37
Homemaker	6,84	1,10	13,27	9,31
<b>Household size (Mean)</b>	2,33	2,44		
<b>Self-perceived health (Mean)</b>	2,85	2,91	2,21	2,50
<b>Depression Scale (Mean)</b>	9,56	9,69	8,35	9,00

received/given.

In households that use formal home care, 66% of the caregivers are male, versus 34% females. This contrasts with households that rely on informal care alone, where 48% are male versus 52% females. Solo caregivers are on average younger (66 years old) than caregivers in households that use formal home care (69 years old). A higher proportion of caregivers that recur to formal home care are retired: 69% versus 61% among solo caregivers.

Focusing on the outcomes, both groups report very similar average levels of self-perceived health and depression. For both, caregivers and receivers, the physical and mental health outcomes are bad, reporting low levels of physical health (3) and high levels of depression (8 to 10).

## 4.2 Impact of home care use on partners' health

Table 2 shows the results of estimating Equation 1 by OLS, with the depression scale as the outcome variable, in different samples. In the first two columns, the entire sample is used, including those that don't claim to be caregivers as long as they live with a partner that receives some type of formal or informal home care. Columns 3 and 4 exclude those who benefit from or provide care outside the household. Finally, in the last two columns, only those who claim to be caregivers are included in the sample.

**Table 2:** Depression Scale

	(1)	(2)	(3)	(4)	(5)	(6)
Any Formal Home Care	-0,025 (-0,36)	-0,002 (-0,03)	-0,04 (-0,61)	0,000 (0,01)	0,121 (0,74)	0,157 (0,96)
Partner's Self-Perceived Health		0,057 (1,84)		0,057 (1,87)		-0,003 (-0,03)
Partner's Depression Scale		0,253*** (18,09)		0,241*** (16,91)		0,186*** (-3,47)
Partner's Education		-0,006* (-2,05)		-0,006 (-1,87)		-0,017*** (-3,47)
Partner's Age		0,002 (0,05)		0,003 (0,08)		-0,049 (0,42)
Gender	-0,744*** (-12,92)	-1,053*** (-16,58)	-0,701*** (-12,14)	-1,000*** (-15,57)	-0,921*** (-5,47)	-1,371*** (-7,40)
Age	0,087* (2,54)	0,078** (2,18)	0,128*** (3,90)	0,120*** (2,88)	-0,033 (-0,31)	-0,026 (-0,23)
Education	0,015*** (2,09)	0,014*** (4,48)	0,013** (3,03)	0,011** (2,97)	0,020** (3,22)	0,022*** (3,81)
Household Size	-0,076* (-2,06)	-0,053 (-1,51)	-0,015 (-0,41)	0,005 (0,14)	0,024 (0,23)	0,068 (0,66)
Employed	0,295*** (3,64)	0,269*** (3,39)	0,385*** (4,57)	0,350*** (4,20)	0,352 (1,24)	0,371 (1,26)
Unemployed	-0,623** (-2,98)	-0,582** (-2,89)	-0,344 (-1,67)	-0,319 (-1,65)	-1,238 (-1,55)	-1,199 (-1,46)
Permanently sick or disabled	-1,266*** (-5,38)	-1,195*** (5,14)	-1,356*** (-6,52)	-1,221*** (-6,03)	-0,931 (-1,90)	-0,917 (-1,95)
Homemaker	0,115 (0,95)	0,096 (0,83)	0,051 (0,040)	0,067 (0,54)	0,313 (1,12)	0,157 (0,60)
Other Status	-0,104 (-0,38)	-0,111 (0,43)	0,069 (0,24)	0,014 (0,05)	0,263 (0,52)	0,195 (0,33)
Received Help from Outside de Household	0,095 (1,77)	0,096 (1,86)			-0,309* (-1,98)	-0,317* (-2,04)
Provided Help Outside de Household	-0,542** (-2,77)	-0,506** (-2,80)				
<b>N</b>	6196	6196	6283	6283	846	846

(1) and (2) - includes the entire sample; (3) and (4) - excludes those who benefit from or provide care outside the household; (5) and (6) - only includes those who claim to be caregivers; All models include fixed effects at the country and wave level; "Retired" is the base for the employment factor variables; t statistics in parentheses; \* p<0.05, \*\* p<0.01, \*\*\* p<0.001

First, we don't find evidence that the mental health of the caregiver is influenced by formal home care use. There are at least three potential explanations for this result. The first is simply that formal home care use does not impact spouse caregivers' health. The second is that there isn't enough statistical power to identify an effect. The third is that reverse causality, in particular that individuals with caregivers with poor mental health may be more likely to use formal home care, is contaminating the potentially beneficial effect of formal home care use on mental health.

Controlling for the partner's characteristics (the care receiver's) does not seem to affect (significantly) the coefficient of formal home care use. Although still not statistically significant, in the last two columns, where only those who identify themselves as caregivers are included, the coefficient of interest is positive (in the first four columns the coefficient is about zero). One possible explanation is that this sample is more refined; it may include those individuals that may be realizing more intensive tasks (e.g. personal care as opposed to housekeeping as usual), such that receiving formal home care can really be a relief.

Now, focusing on self-perceived health as the outcome variable, Table 3 presents the results of both OLS and Ordered Probit Marginal Effects (ME). This table follows the same order as Table 2, but we always present both OLS coefficients and ME.

Formal home care use is only statistically significant when we remove caregivers that give or benefit from outside help, implying that benefiting from formal home care has a positive impact on caregiver health (column 7). Apart from that specification, formal home care use is not statistically significant. Once again, in general controlling for the partner's variables doesn't have much impact.

Overall, the remaining variables have the expected signs: partner health status (both physical and mental) has a positive sign, meaning that the health status of both members of the couple

moves hand-in-hand. Interestingly, in most cases, caregiver physical health is only influenced by partner physical health status (and not mental health status) and caregiver mental health is only influenced by partner mental health status (and not physical health). Men seem to have a more positive experience in caregiving than women, as they report better physical and mental outcomes. Possibly, in general women see caregiving as an obligation, due to cultural and social norms, or caregiving adds to all the other tasks around the household that already fall on them, while men, who are traditionally not expected to provide care or perform household tasks, are able to derive a sense of self-fulfillment when caring for their partner. Also, male caregivers are a selected group (e.g. more often than not, the husband is older and more disabled than the wife). The more educated people are, the better their health outcomes, and employed individuals also report better (mental) health. To conclude, receiving informal care from outside the household (e.g. from children) is positively associated with caregiver physical and mental health, suggesting that sharing caregiving tasks with other relatives/friends has a protective effect on caregiver health.

#### **4.2.1 Propensity Score Matching**

PSM results on the full sample, i.e. including those that don't claim to be caregivers as long as they live with a partner that receives some type of formal or informal home care, are displayed in Table 4. Looking at the simple, unmatched difference, we see that caregivers in households that use formal home care report slightly lower levels of both physical and mental health. These differences were already observed in Table 1. Matching on observables, the Average Treatment Effect on the Treated (ATT) is positive, albeit not statistically significant, so caregivers in households that use formal home care have slightly better physical and mental health compared to caregivers in households that rely only on informal care and that are similar

in terms of sociodemographic and household characteristics and partner health status.

In Table 5 the results of the Probit model implicit to the PSM are displayed. The probability of using formal home care depends negatively on partner physical health, whereas mental health status has no influence. Possibly, individuals with poor mental health are more likely to be institutionalized, not remaining in their homes and relying on (in/)formal home care.

As for other determinants, as expected, more educated individuals as well as women are more likely to seek formal home care. This may be partly explained by the fact that women are usually the younger member of the couple, so when they start to need care, more often than not the husband already needed care before and is not an able caregiver. Individuals who receive help from outside the household, provided by a family member or a friend, are less likely to use formal home care.

Remembering the reverse causality issue, PSM would capture this effect. One cannot be completely sure that benefiting from formal home care leads to better health outcomes but can be sure that it will not negatively impact them. Thus, we can say that, at least, formal home care does not lead to worse health outcomes.

#### **4.2.2 Fixed Effects**

After controlling for time-invariant individual/household characteristics, using formal home care is still not statistically significant (Table 6). As for the remaining variables, results are in line with those from pooled OLS models shown previously.

## **5 Discussion**

In this study, we explored the impact of formal care use on spousal caregivers' physical and mental health. We used a multidisciplinary, cross-national panel database covering more than

twenty European countries, SHARE and tried to address the endogeneity of formal home care use using PSM and FE models (and IV, without success).

Although neither method allows ruling endogeneity out completely, in particular the part of endogeneity that is due to reverse causality, it seems that, at least, formal home care use does not lead to worse health outcomes for the caregiver. We find no statistically significant effects of formal home care use on caregiver health in virtually any specification attempted. This finding is consistent with the presence of reverse causality, because we may expect reverse causality to result in the underestimation of a potentially positive effect of formal home care use on caregiver health.

Yet, there are some noteworthy results. First, there are more male caregivers that also count on formal home care providers than females, i.e. females are more often sole caregivers. Additionally, men tend to find this experience more enjoyable than women. This is in line with the available literature, with some studies reporting that male caregivers are more likely to ask for outside help and may find the caregiving experience more positive than women (Kim, Baker, and Spillers 2007). Second, caregivers report low levels of physical and mental health, irrespective of formal home care use. Third, we find a positive correlation between caregivers and care receivers' health status. According to the available literature, the simple fact of having a partner that needs help/in poor health hurts the caregiver's health (Savage and Bailey 2004).

Given that there is virtually no literature on the effect of formal home care use on caregiver health, comparisons with previous findings remains limited. However, Juin (2019), that studies the impact of formal home care on the health of non-coresiding caregivers, concludes that formal home care has a positive impact on caregivers health.

Our results are subject to some limitations, mainly the presence of endogeneity. As mentioned, PSM and FE models partly deal with unobserved heterogeneity, but confounding due to

time-varying household characteristics and reverse causality may remain. IV estimation could address both issues but unfortunately, our IVs did not work, as they were not relevant. Future research could explore similar IVs but at a smaller level of aggregation, similarly to Dong, Pollock, and Konetzka (2019), who use indicators of formal LTC supply at the county level, for the USA. In Europe, such approach may have to be done on a country-by-country basis, using other data sources, as SHARE only provides NUT-level residential codes. This is what is done by Juin (2019), who focuses on the case of France and uses as instrument a local-level indicator of reliance on the Personal Autonomy Allowance, which is a subsidy for home care use. Another French study uses the lowest regulated price of home care at the department level (Perdrix and Roquebert, 2019). Future research could also compare the health outcomes of caregivers that provide care for long periods of time with those that provide care to a partner for short periods, for example, due to post-acute rehabilitation. This would require richer data, for example with a lower interval between waves.

Overall, more research is necessary to fully understand the impacts of formal home care on spousal health outcomes, in order to inform LTC policies. Hopefully, this study raises awareness about this important topic which has been largely overlooked until now.

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**Table 3: Self-Perceived Health**

	(1) OLS	(2) ME	(3) OLS	(4) ME	(5) OLS	(6) ME	(7) OLS	(8) ME	(9) OLS	(10) ME	(11) OLS	(12) ME
Any Formal Home Care	-0,024 (-0,80)	-0,028 (-0,72)	-0,008 (-0,28)	-0,008 (-0,21)	0,026 (0,92)	0,030 (0,81)	0,057* (2,03)	0,071 (1,90)	-0,026 (-0,36)	-0,036 (-0,38)	-0,042 (-0,59)	-0,058 (-0,620)
Partner's Self-Perceived Health	0,171*** (11,34)	0,221*** (11,33)	0,171*** (11,34)	0,221*** (11,33)	0,178*** (12,03)	0,178*** (12,03)	0,178*** (12,03)	0,229*** (12,00)	0,093 (1,78)	0,127 (1,90)	0,093 (1,78)	0,127 (1,90)
Partner's Depression Scale	0,010 (1,73)	0,015* (1,96)	0,010 (1,73)	0,015* (1,96)	0,010 (1,90)	0,010 (1,90)	0,010 (1,90)	0,016* (2,11)	-0,002 (-0,16)	-0,001 (-0,06)	-0,002 (-0,06)	-0,001 (-0,06)
Partner's Education	0,000 (0,20)	0,000 (0,15)	0,000 (0,20)	0,000 (0,15)	-0,001 (-0,61)	-0,001 (-0,61)	-0,001 (-0,61)	-0,001 (-0,65)	-0,005 (-1,58)	-0,006 (-1,46)	-0,005 (-1,46)	-0,006 (-1,46)
Partner's Age	0,020 (1,23)	0,025 (1,20)	0,020 (1,23)	0,025 (1,20)	0,031 (1,91)	0,031 (1,91)	0,031 (1,91)	0,041 (1,90)	0,032 (0,70)	0,048 (0,70)	0,032 (0,70)	0,048 (0,70)
Gender	-0,049* (-2,00)	-0,064* (-2,00)	-0,096** (-3,41)	-0,130*** (-3,47)	-0,035 (1,46)	-0,046 (-1,41)	-0,071* (-2,49)	-0,095* (-2,51)	-0,157* (-1,99)	-0,204 (-1,94)	-0,098 (-1,49)	-0,125 (-1,42)
Age	-0,020 (-1,52)	-0,020 (-1,17)	-0,022 (-1,48)	-0,022 (-1,18)	0,234*** (2,00)	-0,027 (-1,70)	-0,032* (-2,31)	-0,037* (-2,11)	-0,026 (-0,43)	-0,033 (-0,40)	-0,024 (-0,45)	-0,026 (-0,38)
Education	0,005* (2,19)	0,007* (2,24)	0,005* (1,97)	0,006* (2,02)	0,004 (1,74)	0,005 (1,85)	0,003 (1,44)	0,004 (1,54)	0,007 (1,35)	0,100 (1,42)	0,007 (1,20)	0,009 (1,25)
Household Size	0,018 (1,26)	0,023 (1,25)	0,022 (1,54)	0,029 (1,55)	0,022 (1,56)	0,027 (1,48)	0,024 (1,70)	0,031 (1,65)	0,059 (1,43)	0,085 (1,58)	0,049 (1,19)	0,071 (1,33)
Employed	0,186*** (5,15)	0,229*** (5,02)	0,173*** (4,78)	0,218*** (4,65)	0,166*** (4,57)	0,218*** (4,74)	0,154*** (4,20)	0,206*** (4,34)	0,051 (0m39)	0,064 (0m39)	0,043 (0,35)	0,051 (0,310)
Unemployed	-0,052 (-0,67)	-0,079 (-0,78)	-0,021 (-0,28)	-0,040 (-0,39)	-0,169* (-2,06)	-0,219* (-2,02)	-0,130 (-1,57)	-0,173 (-1,54)	-0,179 (-0,59)	-0,296 (-0,68)	-0,239 (-0,77)	-0,371 (-0,83)
Permanently sick or disabled	-0,868*** (-12,46)	-1,356*** (-9,39)	-0,825*** (-11,91)	-1,324*** (-9,14)	-0,793*** (-11,61)	-1,230*** (-9,14)	-0,751*** (-10,65)	-1,393*** (-8,58)	-0,768*** (-4,75)	-1,277*** (-3,72)	-0,756*** (-4,42)	-1,262*** (-3,56)
Homemaker	0,006 (0,13)	0,011 (0,19)	0,010 (0,24)	0,016 (0,27)	0,007 (0,15)	0,015 (0,24)	0,018 (0,39)	0,027 (0,45)	0,040 (0,38)	0,043 (0,30)	0,053 (0,50)	0,061 (0,43)
Other Status	-0,084 (-0,65)	-0,122 (-0,71)	-0,066 (-0,52)	-0,102 (-0,59)	-0,032 (0,23)	0,033 (0,18)	0,049 (0,37)	0,049 (0,28)	1,024** (3,13)	1,309** (2,94)	0,980** (3,05)	1,256** (2,85)
Received Help from Outside de Household	0,102*** (4,27)	0,136*** (4,47)	0,095*** (4,07)	0,131*** (4,28)	0,095*** (4,07)	0,131*** (4,28)	0,095*** (4,07)	0,131*** (4,28)	0,056 (0,87)	0,089 (1,04)	0,066 (1,02)	0,102 (1,20)
Provided Help Outside de Household	-0,127* (-1,97)	-0,175* (-2,03)	-0,107 (-1,66)	-0,152 (-1,72)								
N	6035	6035	6035	6035	6037	6037	6037	6037	828	828	828	828

OLS - OLS estimation; ME - Marginal Effects from an Ordered Probit model; (1) to (4) - includes the entire sample; (5) to (8) - excludes those who benefit from or provide care outside the household; (9) to (12) - only includes those who claim to be caregivers; All models include xed effects at the country and wave level; "Retired" is the base for the employment factor variables; t statistics in parentheses; \* p<0.05, \*\* p<0.01, \*\*\* p<0.001

**Table 4:** Matching Estimates: Effects of Formal Home Care

<b>Depression Scale</b>	<b>Treated</b>	<b>Controls</b>	<b>Difference</b>	<b>Standard Error</b>
<b>Unmatched</b>	9,798	9,862	-0,064	0,061
<b>ATT</b>	9,760	9,730	0,030	0,084
<b>Self-perceived health</b>	<b>Treated</b>	<b>Controls</b>	<b>Difference</b>	<b>Standard Error</b>
<b>Unmatched</b>	1,052	1,118	-0,065	0,027
<b>ATT</b>	1,055	1,093	0,030	0,036

Matching compares a untreated group of 4723 (scale) and 4588 (self-perceived health) persons with a treatment group of 1473 (scale) 1447 (self-perceived health) persons. The results illustrate a 1 to 1 propensity score matching with no replacement and a caliper of 0.2 of the standard error, in the selection equation.

**Table 5:** Propensity Score Matching - Determinants

Dependent Variable: Any Formal Home Care		
	<b>Depression</b>	<b>Self-Perceived Health</b>
Partner's Self-Perceived Health	-0,092*** (0,026)	-0,099*** (0,026)
Partner's Depression Scale	-0,005 (0,010)	-0,005 (0,010)
Partner's Education	0,007** (0,003)	0,008** (0,003)
Partner's Age	-0,033 (0,027)	-0,033 (0,028)
Gender	-0,485*** (0,051)	-0,492*** (0,051)
Age	-0,053 (0,028)	-0,046 (0,027)
Education	0,006 (0,004)	0,007* (0,003)
Household Size	-0,045 (0,027)	-0,040 (0,027)
Employed	-0,007 (0,067)	0,009 (0,067)
Unemployed	-0,083 (0,135)	-0,052 (0,137)
Permanently sick or disabled	-0,018 (0,160)	0,094 (0,165)
Homemaker	-0,130 (0,084)	-0,128 (0,086)
Other Status	0,075 (0,185)	0,151 (0,189)
Received Help from Outside de Household	-0,144* (0,043)	-0,154*** (0,043)
Provided Help Outside de Household	-0,026 (0,124)	-0,039 (0,126)
<b>N</b>	<b>6196</b>	<b>6035</b>

The table displays the Probit model implicit to the computation of the propensity scores. It includes xed effects at the country and wave level. "Retired" is the base for the employment factor variables. Standard Error in parenthesis. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 6: Fixed Effects**

	<b>Depression</b>	<b>Self-Perceived Health</b>
Any Formal Home Care	-0,058 (0,086)	0,132 (0,186)
Partner's Self-Perceived Health	0,041 (0,039)	0,232* (0,080)
Partner's Depression Scale	0,041*** (0,039)	0,041 (0,032)
Partner's Education	-0,326 (0,337)	0,635 (0,753)
Partner's Age	0,111 (0,96)	-0,102 (0,194)
Age	0,001 (0,094)	0,240 (0,198)
Education	0,112 (0,356)	15.670*** (0,755)
Household Size	-0,083 (0,049)	0,064 (0,094)
Employed	-0,363*** (0,096)	-0,306 (0,184)
Unemployed	-0,542* (0,197)	-0,009 (0,401)
Permanently sick or disabled	-0,260 (0,274)	-1,2* (0,496)
Homemaker	-0,040 (0,168)	0,391 (0,327)
Other Status	-0,223 (0,223)	-0,419 (0,444)
Received Help from Outside de Household	-0,056 (0,057)	0,181 (0,116)
Provided Help Outside de Household	-0,361* (0,187)	-0,701 (0,416)
<b>N</b>	<b>9880</b>	<b>3440</b>

The table displays, in the first column Fixed Effects OLS model and in the second column Fixed Effects of a Ordered Logit Model. The individual variables that did not change through time are dropped. "Retired" is the base for the employment factor variables. Standard Errors in parenthesis. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

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