Does social isolation affect medical doctor visits? New evidence among European older adults

Abstract We aimed to determine whether social isolation is associated with higher health care utilization among European older adults. We have used panel data (2004-2015) from the Survey of Health, Ageing and Retirement in Europe (SHARE) to examine the impact of social isolation on general practitioner health care use. Precisely, we have considered negative binomial panel count data models to study the main driving factors. Socio-demographic, health and social isolation measures are analysed. Differences by Welfare Regimes have been also considered. Using two definitions of social isolation (Alone and Help), we have found that a sizeable proportion of those aged 50 years and older in Europe reported social isolation. Our results showed that while non-partnership was significantly and positively correlated with health care utilization (β=0.03), providing help was significantly and negatively related with physician visits considering the full sample of European countries (β=-0.09). Differences by Welfare Regimes are highlighted. Also, Mediterranean countries consume more health care services than other European ones. Targeting interventions for social isolated elders may significantly decrease general practitioner consultations, and so, health care costs. Our findings provide several implications in current debates on the sustainability of welfare states.

Keywords Europe; aging; social isolation; health care utilization; SHARE; count data models.

Introduction

Population ageing is a matter that concerns all countries (Yenilmez 2015), and especially European ones. According to Eurostat, the proportion of people aged 65 or over (old dependency ratio) rose from 23.5% to 29.9% between 2001 and 2017 for the EU-28 countries (Eurostat 2018). The main issues are related to the maintenance, and improvements, of the individuals' well-being through different policies without

threatening the sustainability of modern Welfare States. The identification of the different factors determining demand for social and health care services is decisive to tackle these challenges. In this study, we are going to focus on health care utilization after age 50.

Since Arrow (1963) and Grossman (1972a b) different contributions have empirically analysed the relationship between several socio-demographic and health determinants, and health care utilization (Morris et al. 2005; Hernández-Quevedo and Jiménez-Rubio 2009; Devaux 2015; Terraneo 2015; Schulz 2019). Generally, these authors demonstrate the higher the age, the lower the socioeconomic status and the worse health status, the higher the expected health care utilization. Besides, some research advocates that there may also be a direct link, regardless of health status, between social isolation and health care utilization (Barsky 1981; Ellaway et al. 1999; Mundt and Zakletskaia 2014: Taube at al. 2015; Gerst-Emerson and Jayawardhana 2015; Shaw et al. 2017; Mitsutake et al. 2018; Valtorta et al. 2018).

The aim of this paper is to examine the effect of social isolation factors (using two definitions *Alone* and *Help*) on medical doctor visits over the 2004-2015 period for individuals aged fifty and over in a sample of different European countries from the Survey of Health, Ageing and Retirement in Europe (SHARE). Regarding social isolation, we refer to contacts with individuals within the respondent's network, and we do not take as such an individual's subjective feeling of loneliness (Cantarero et al. 2019). We use a unified framework embedding panel count data techniques. In doing so, we are able to assess the robustness of our results to alternative estimations through allowing for dynamic estimates and possible heterogeneity between countries. Indeed, in addition to the full sample, three Welfare Regimes are considered. Our findings show that both traditional socio-demographic and health determinants, and the "newest" risks factors considered here (and associated with social isolation), are related with health care utilization. However, some differences by Welfare Regimen are observed. Individual countries would be grouped in the Welfare Regimes, following Esping-Andersen (1990) and recent related literature (Srakar and Rupel 2016). Mediterranean states are therefore considered as a separate regime characterized by the strong supportive role of family networks.

Several features distinguish the paper from previously published studies. Firstly, this paper exploits the latest available panel data structure. Secondly, on the empirical side, our study highlights specific risks associated with factors linked with social isolation which provides basic information when it comes to designing public-health and social

policies. Consistent with this, Governments should be actively engaged and place more emphasis on the drivers behind the impacts that population aging has on higher use of health care services and social resources.

The paper is organized as follows. In Section 2, we describe the data sources and methodological issues. Besides, Section 3 presents the empirical results whereas main conclusions and policy implications are shown in Sections 4 and 5.

Methods

Sample selection

We use data from five panel waves of SHARE (Waves 1, 2, 4, 5 and 6). Precisely, the ones in easySHARE release 6.1.0. (Börsch-Supan et al. 2018) Wave 3 (SHARELIFE) is not finally considered as medical doctor visits (among other) are not asked in. Data collection ran in the periods 2004-2005, 2006-2007, 2011-2012, 2013 and 2015, respectively. However, the longitudinal approach of the study led us to retain only the 9 countries whose respondents participated in all the considered waves.

Besides, we also explore several patterns between Welfare Regimes: (i) Social-democratic (Denmark and Sweden); (ii) Continental (Austria, Belgium, France, Germany and Switzerland); (iii) Mediterranean (Italy and Spain). Therefore, our final sample consists of 31,536 observations distributed as follows by Welfare Regime: 6,843, 16,627 and 8,066 observations, respectively. Table I (Appendix) shows the sample distribution by country and Welfare Regimen.

Measures

In the empirically literature there are various examples of modelling count measures for health care (Pohlmeier and Ulrich 1995; Deb and Trivedi 2002; Kunz and Winkelmann 2017). This body of studies usually consider as regressors variables related with age, sex, need/morbility, and other socio-demographic factors such as marital status, education attainment and labour status. Then, selected measures are justified and validate our model.

Health care utilization: The variable that it is used as dependent variable in our estimates is a count one (*GP*): number of times the respondent has seen or talked to medical doctor during the last 12 months. Fig. 1 (Appendix) presents its distribution by Welfare Regimen. It could be highlighted that Mediterranean countries have higher contacts with *GP* (8.59) whereas Social-democratic countries have the lesser consultations (4.14). All variables used in estimates are described in Table 1.

[Insert Table 1]

Socio-demographic (using for all dummy variables): gender (1 if female), age (four levels: 50-59 years, 60-69 years, 70-79 years and ≥ 80 years), native (1 if born in the country of interview), educational level (measured according to international classification ISCED-97: low, middle and high education), employment status (retired) or geographic characteristics (value 1 if the person lives in a *Rural* area or not) are considered.

Health: we consider *MCCs* that is a binary one, it takes value 1 if the person is diagnosed with three or more chronic diseases (Multiple Chronic Conditions) and zero otherwise. While it may not be surprising that more and more elderly Europeans have a chronic condition, what is striking is the increasing number of people that have multiple chronic conditions. Besides, because multicollinearity bias could appear in estimates, other health variables (in spite being available in the survey, such as self-assessed health) are excluded in our final model.

Social isolation measures (behavioural risk factors): information is covered through two isolation proxies. *Alone* that takes value 1 if respondent is non-married or non with a registered partner, and *Help* which take value 1 if among the activities of the individual during the last year include providing help. Table II in the Appendix presents the prevalence of social isolation measures by SHARE Wave and Welfare Regimen. Percentages for given help are higher in all cases than the ones for *Alone.* Overall, it should be noted that Mediterranean values are always smaller.

As we investigate relationships between social isolation and utilization of GP health services, Fig. 2 (Appendix) plots the number of GP visits by SHARE wave and social isolation measure. As expected, *Help* proxy would be related with less GP contacts whereas the *alone* one presents the reverse effect. That is, an increase in health care utilization.

Method of analysis

Two characteristics of the data led us to select the suitable econometric approach: (i) the dataset is longitudinal and (ii) the selected dependent variable is a count variable (non-negative integer valued count *GP* = 0, 1, …). Hence, exploiting the panel structure of the data would allow us to relax the homogeneity assumption and control for unobserved individual heterogeneity, as well as for potential differences between SHARE waves.

The basic count data regression model is the Poisson one. However, it has been proved to be restrictive for modelling health care utilization, and so, more general specifications are preferred. Precisely, in this application we have used negative binomial regression models (Cameron and Trivedi 1986; Jones et al. 2013). Health care utilization data usually contain a large proportion of zeros. Zero inflacted models are then required to give more weight on the probability that the count variable equals zero. Nevertheless, due to the nature of our sample (population aged ≥ 50), it is not applicable here. The specification to be analysed would take the following general form:

$$GP_{it} = \propto_i + x'_{it}\beta + u_{it} \quad (1)$$

where x_{it} is a vector of characteristics for individual *i* at the *th* observation, β is a vector of parameters to be estimated and u_{it} is the error term. Individual effects model allows for time series persistence via unobserved heterogeneity ($\propto_i$). Consequently, the Poisson or negative binomial model, as appropriate, would have the following form:

$$\mu_{it} \equiv E(GP_{it}|x_{it}, \propto_i) = \propto_i \exp(x_{it}\beta); \qquad i = 1,\ldots,n \;\; t = 1,\ldots, T \quad (2)$$

Besides, as many doctor visits last period lead to many, dynamic panel count models are considered:

$$GP_{it} = \propto_i + \rho GP_{i,t-1}\, x'_{it}\beta + u_{it} \quad (3)$$

Count speciation for dynamic model would be:

$$\mu_{it} \equiv \rho GP_{i,t-1} + \propto_i \exp(x_{it}\beta) \quad (4)$$

For simplicity, we have considered models where μ_{it} depends on just the first lag of GP_{it} (Cameron and Trivedi 2013). As a result, the exponential feedback model is:

$$\mu_{it} \equiv \propto_i \exp(\rho GP_{i,t-1} + x_{it}\beta), \quad (5)$$

In the following section, static and dynamic models are applied.

Results

In this section, we present the empirical results for the model described above based on our two social isolation proxies, socio-demographic and health variables. Additionally, given the scope of our study, we first perform some descriptive analysis (Tables III-IV in Appendix).

Descriptive findings

Main characteristics for the full sample while also considering our two social isolation measures are shown. The sample of participants with full data consisted on 31,536 individuals, 57.32% females and the average age is 68.11 years. Higher GP visits are associated with *Alone* measure and lesser for *Help* one. Similarly, we exploit that information while also accounting for Welfare Regimen differences.

Consequently, these tables are the first approximation to determine both, the main factors associated with medical doctor visits and potential divergences by Welfare Regimen (e.g., Mediterranean participants visit more their GP, they are the eldest and have higher percentages of females). Overall, as expected for all the samples considered, social isolation would increase health care utilization. The same applies the higher the age, the lower education, being retired or individuals with multiple chronic conditions, and somehow for females.

Panel count data estimates

Firstly, main estimates for our static count panel data models are reported (Tables 2-3); secondly, we provide the dynamic ones (Tables 4-5). Further estimates for the number of GP visits (Incidence Rate Ratios) are available upon request. On the one hand, in the first of each we refer to the full sample when controlling for Mediterranean Welfare Regimen that appears as explanatory variable due to the abovementioned descriptive findings. On the other hand, the latest, we present the results distinguishing by Welfare Regimen.

[Insert Table 2]

Table 2 shows the baseline results of our regression models. Regarding socio-demographic factors, *Female* has a positive and strong influence. Then, women tend to use medical doctors services more frequently than men do (about 17 percent more times). For age, the 60-69, 70-79 and ≥ 80 years groups have more frequent visits than the 50-59 one. It is corroborated that the higher the age, the higher health care utilization. However, born in the country of interview is not significantly related to the number of GP visits. When considering education, the highest level tends to have significantly less visits; the relationship is stronger in significance compared to middle education. Being the respondent retired would increase GP visits by 6 percent. Rural residents tend to have more visits ~~which can be an indication of better access to medical doctor in small towns, rural areas or villages~~. As for the multiple chronic conditions, the pattern is clear: the worse the health, the more visits. Around 60% more than the group without the specific health circumstance. Nevertheless, considering social isolation measures, both proxies demonstrate having a strong impact on the number of GP visits: non-partnership was significantly and positively associated with health care utilization (3 percent more times), and providing help is significantly and negatively related with physician visits (6 percent lees times). Turning to possible differences in Welfare Regimes, compared to Social-democratic and Continental (reference category), Mediterranean countries tend to have more visits. Different factors could be behind these results, that is why in Table 3 we run the estimates by different samples (by Welfare Regimen).

[Insert Table 3]

Column 1 presents the variables; Column 2 describes the detailed findings for the full sample whereas the following ones do it for each of the Welfare Regimes. Results somehow present changes with the aforementioned ones. Formerly, the main discrepancies are observed for the following factors. Education variables present the reverse effect in Social-democratic countries. Additionally, high education is not significant for Continental ones. Besides, rural location is only significant when considering the full sample of countries. As for our main control variables, the social isolation measures, different patterns (as expected) are provided. Indeed, differences regarding familistic countries are observed, social isolation proxies are not significant for Mediterranean countries. In Southern Europe, the majority of caring responsibilities rest on the family whereas in Nordic countries this responsiveness is largely supported by the

State. Furthermore, *Help* would matter for both the Social-democratic and Continental Welfare Regimens (for the latest it is only significant at 10%, and so, must be interpreted with carefulness), whereas *Alone* would be only significant for the Social-democratic (but this proxy, as is statistical significant at 10%, again, should be used and interpreted with caution). Therefore, different interventions and tools should be considered in each Welfare Regimen.

As previously indicated, many doctor visits could lead to more ones. Thus, dynamic panel count models are considered in Tables 4 and 5. These Tables corroborate in some way that foresight when considering the full sample (0.6 percent more times) and both Continental and Mediterranean Welfare Regimes (0.2 percent more times). It is important to be highlighted that previous comments on results for linear estimates are consistent and stable.

[Insert Table 4]

[Insert Table 5]

Discussion

Financial pressure and their implications for the financial sustainability of health care systems are often confronted with the demands for health care services for older adults. That is, regardless of their disability and/ or morbidity status, elder population are regular users of GP services. Precisely, we have focused on multiple determinants (both traditional socio-demographic and health ones, while "the newest" risks factors associated with social isolation) related with health care utilization. Besides, geographic heterogeneity is also considered (i.e. Mediterranean countries would use more GP services).

Under two definitions of social isolation using SHARE, we have found that in the European Union these variables are significantly associated with the number of doctor visits. Therefore, we have hypothesized that for many elderly the doctor visits provide "more" than medical treatment. Then, social isolated people would seek for social contact through these physician visits. That is, GPs provides social support. This study supports

previous research (indicating that social isolation is a significant public health issue, especially among older adults, those aged 50 years and older (Ilinca and Calciolari 2015; Taube at al. 2015; Gerst-Emerson and Jayawardhana 2015; Srakar and Rupel 2016).

Indeed, our main findings could be grouped as follows: (i) among socio-demographic factors it is obtained than respondent being female, the higher the age and the lesser the educational level would be associated with higher GP visits; (ii) health factors implies than those that reported more health need would use more often health care services; (iii) in spite the fact different socio-demographic and health variables would matter on medical doctor visits, it should be clear up that elderly Europeans with less social isolation would decrease the expected number of visits per year (Peytremann-Bridevaux et al. 2008; Ladin 2012; Gerst-Emerson and Jayawardhana 2015; Banbury et al. 2017).

Nevertheless, some limitations and extensions should be also considered. For the first one, in spite the fact we are working with micro data we should remember that it is self-reported information. For the latest, when more data would be available, it should be interesting to bear in mind depth differences between and within countries. All in all, despite the above-mentioned limitations, we can postulate that this study provides new and valid information on the understanding of health care utilization by (lonely) elderly people across Europe.

Our finding provide key messages for both policy makers and professionals because in order to enhance efficiency, equity and quality of health care systems, social displacement should be considered (among the well-known traditional determinants) in the development of new public policies. Beyond the large variability observed across countries, this would provide information that could determine the success of the European Welfare States. In spite the fact that our findings point out there are similar patterns in the sample considered, some discrepancies are also determined, different strategies should be then considered though each Welfare Regimen. At this regard, previous studies have pointed out the importance of both group-based interventions and one-to-one interventions, e.g. educational courses on social behaviours; volunteer programs, and/ or providing services like transportation or internet use (Landeiro et al. 2017; Wigfield et al. 2018).

Conclusion

In the study above, using SHARE data, we have presented an empirical analysis of determinants of health care utilization for European older adults. Indeed, once health outcomes have been suggested for social isolation and loneliness factors, we focus on the impact of social isolation on a tangible public health and public policy outcome (health care utilization). Hence, different factors have been analysed: socio-demographic, health and social isolation ones. While caution must be used when generalizing results, the accuracy and robustness of our estimates, give us the confidence to express general conclusions.

Overall, our findings are in line with both traditional and recent studies. Then, it has been highlighted that behavioural risk determinants for health care utilization should be considered along with the traditional socio-demographic and health driving factors. Specifically, it is highlighted the pressure on the financial sustainability of health care systems from (unnecessary) demands of elderly people which would increase general practitioner consultations, and so, health care costs. These findings would provide information to allow a better decision-making about public health priorities in European countries and the people at risk of social isolation. Overall, heterogeneity between areas should be considered in different social and health public policies.

Appendix

[Insert Tables I-IV and Fig. 1 and Fig. 2]

References

Arrow, K. J. (1963). Uncertainty and the welfare economics of medical care. *The American Economic Review*, *53*(5), 941-973.

Banbury, A., Chamberlain, D., Nancarrow, S., Dart, J., Gray, L., & Parkinson, L. (2017). Can videoconferencing affect older people's engagement and perception of their social support in long-term conditions management: a social network analysis

from the Telehealth Literacy Project. *Health & Social Care in the Community*, *25*(3), 938-950.

Barsky, A. J. (1981). Hidden reasons some patients visit doctors. *Annals of Internal Medicine*, *94*(4_Part_1), 492-498.

Börsch-Supan, A., S. Gruber, C. Hunkler, S. Stuck, J. Neumann (2018): *easy*SHARE. Release version: 6.1.0. SHARE-ERIC. Dataset. doi: 10.6103/SHARE.easy.610

Cameron, A. C., & Trivedi, P. K. (1986). Econometric models based on count data. Comparisons and applications of some estimators and tests. *Journal of Applied Econometrics*, *1*(1), 29-53.

Cameron, A. C., & Trivedi, P. K. (2013). Count panel data. *Oxford Handbook of Panel Data, Oxford University Press, Oxford*.

Cantarero-Prieto, D., Pascual-Sáez, M., & Blazquez-Fernandez, C. (2018). Social isolation and multiple chronic diseases after age 50: A European macro-regional analysis. *PloS one*, *13*(10), e0205062.

Deb, P., & Trivedi, P. K. (2002). The structure of demand for health care: latent class versus two-part models. *Journal of Health Economics*, *21*(4), 601-625.

Devaux, M. (2015). Income-related inequalities and inequities in health care services utilisation in 18 selected OECD countries. *The European Journal of Health Economics*, *16*(1), 21-33.

Ellaway, A., Wood, S., & Macintyre, S. (1999). Someone to talk to? The role of loneliness as a factor in the frequency of GP consultations. *British Journal of General Practice*, *49*(442), 363-367.

Esping-Andersen, G. (1990). 4 the three political economies of the Welfare State. *International Journal of Sociology*, *20*(3), 92-123.

Eurostat (2018). Eurostat Statistics. European Commission.

Gerst-Emerson, K., & Jayawardhana, J. (2015). Loneliness as a public health issue: the impact of loneliness on health care utilization among older adults. *American Journal of Public Health*, *105*(5), 1013-1019.

Grossman, M. (1972a). *The demand for health: a theoretical and empirical investigation*, New York: National Bureau of Economic Research: Columbia University Press.

Grossman, M. (1972b). On the concept of health capital and the demand for health. *Journal of Political Economy, 80*(2), 223-255.

Hernández-Quevedo, C., & Jiménez-Rubio, D. (2009). A comparison of the health status and health care utilization patterns between foreigners and the national population

in Spain: new evidence from the Spanish National Health Survey. *Social Science & Medicine*, *69*(3), 370-378.

Ilinca, S., & Calciolari, S. (2015). The patterns of health care utilization by elderly Europeans: frailty and its implications for health systems. *Health Services Research*, *50*(1), 305-320.

Jones, A. M., Rice, N., d'Uva, T. B., & Balia, S. (2013). *Applied Health Economics*. Routledge.

Kunz, J. S., & Winkelmann, R. (2017). An econometric model of healthcare demand with nonlinear pricing. *Health Economics*, *26*(6), 691-702.

Ladin, K. (2012). Decomposing differences in utilization of health services between depressed and non-depressed elders in Europe. *European Journal of Ageing*, *9*(1), 51-64.

Landeiro, F., Barrows, P., Musson, E. N., Gray, A. M., & Leal, J. (2017). Reducing social isolation and loneliness in older people: a systematic review protocol. *BMJ Open*, *7*(5), e013778.

Mitsutake, S., Koike, T., Ishizaki, T., Nishi, M., Kobayashi, E., Hasebe, M., ... & Fujiwara, Y. (2018). The associations of social isolation with medical and long-term care utilization among older adults in Japan. *Innovation in Aging*, *2*(Suppl 1), 1017.

Morris, S., Sutton, M., & Gravelle, H. (2005). Inequity and inequality in the use of health care in England: an empirical investigation. *Social Science & Medicine*, *60*(6), 1251-1266.

Mundt, M. P., & Zakletskaia, L. I. (2014). That's what friends are for: adolescent peer social status, health-related quality of life and healthcare costs. *Applied Health Economics and Health Policy*, *12*(2), 191-201.

Peytremann-Bridevaux, I., Voellinger, R., & Santos-Eggimann, B. (2008). Healthcare and preventive services utilization of elderly Europeans with depressive symptoms. *Journal of Affective Disorders*, *105*(1), 247-252.

Pohlmeier, W., & Ulrich, V. (1995). An econometric model of the two-part decisionmaking process in the demand for health care. *Journal of Human Resources*, 339-361.

Taube, E., Kristensson, J., Sandberg, M., Midlöv, P., & Jakobsson, U. (2015). Loneliness and health care consumption among older people. *Scandinavian Journal of Caring Sciences*, *29*(3), 435-443.

Terraneo, M. (2015). Inequities in health care utilization by people aged 50+: evidence from 12 European countries. *Social Science & Medicine*, *126*, 154-163.

Shaw, J. G., Farid, M., Noel-Miller, C., Joseph, N., Houser, A., Asch, S. M., ... & Flowers, L. (2017). Social isolation and Medicare spending: Among older adults, objective isolation increases expenditures while loneliness does not. *Journal of Aging and Health*, *29*(7), 1119-1143.

Schulz, M. (2016). Do gatekeeping schemes influence health care utilization behavior among patients with different educational background? An analysis of 13 European countries. *International Journal of Health Services*, *46*(3), 448-464.

Srakar, A., & Rupel, V. P. (2016). Health services utilization in older Europeans: an empirical study. *Journal of Management, Informatics and Human Resources*, *49*(2), 127-136.

Valtorta, N. K., Moore, D. C., Barron, L., Stow, D., & Hanratty, B. (2018). Older adults' social relationships and health care utilization: A systematic review. *American Journal of Public Health*, *108*(4), e1-e10.

Wigfield, A., & Alden, S. (2018). Assessing the effectiveness of social indices to measure the prevalence of social isolation in neighbourhoods: a qualitative sense check of an index in a northern English city. *Social Indicators Research*, *140*(3), 1017-1034.

Yenilmez, M. I. (2015). Economic and social consequences of population aging the dilemmas and opportunities in the twenty-first century. *Applied Research in Quality of Life*, *10*(4), 735-752.

Table 1 List of variables and description

	Variable	Description	Coding
Dependent variable	*GP*	Number of times the respondent has seen or talked to medical doctor during the last 12 months	Number of visits
Socio-demographic factors	*Female*	Gender of respondent	1: female; 0: male
	Age	Age of respondent (four levels in estimates as dummies: 50-59 years, 60-69 years, 70-79 years and ≥ 80 years)	Years; 1: person is in the age interval; 0: otherwise
	Native	Born in the country of interview	1: yes; 0: otherwise
	Loweduc	ISCED-97 coding of education, low education	1: low education; 0: otherwise
	Mideduc	ISCED-97 coding of education, middle education	1: middle education; 0: otherwise
	Higheduc	ISCED-97 coding of education, high education	1: high education; 0: otherwise
	Retired	Current job situation	1: respondent is retired; 0: otherwise
	Rural	Area of location (place of residence)	1: respondent lives in a small town, a rural area or village; 0: otherwise
Health factors	*MCCs*	Individual is diagnosed with three or more chronic diseases	1: multiple chronic conditions (MCCs); 0: otherwise

Social isolation measures	*Alone*	Current marital status	1: non-married or non with a registered partner; 0: otherwise
	Help	Respondent has given help during the last 12 months	1: yes; 0: otherwise
Welfare Regime	*Social-democratic*	Individual countries are grouped in the Welfare Regimes	1: Denmark and Sweden; 0: otherwise
	Continental		1: Austria, Belgium, France, Germany and Switzerland; 0: otherwise
	Mediterranean		1: Italy and Spain; 0: otherwise

Source: Authors' elaboration.

Table 2 Results of panel negative binomial regression (full sample), with outcome variable the number of GP visits

	Full sample		
	β	**z**	
Socio-demographic factors			
Female	0.169	14.67	***
60-69 years	0.103	6.03	***
70-79 years	0.236	12.14	***
≥ 80 years	0.318	13.63	***
Native	-0.050	-2.20	**
Mideduc	-0.018	-1.35	
Higheduc	-0.032	-2.08	**
Retired	0.057	4.21	***
Rural	0.066	5.88	***
Health factors			
MCCs	0.592	37.33	***
Social isolation measures			
Alone	0.044	3.56	***
Help	-0.067	-5.39	***
Welfare Regime			
Mediterranean	0.199	14.19	***
Constant	0.952	10.40	***
Observations	31,381		

Source: Authors' calculations based on easySHARE release 6.1.0 (Waves 1 to 6: 2004-2015). Population aged ≥ 50. Welfare Regime: (i) Social-democratic (Denmark and Sweden), (ii) Continental (Austria, Belgium, France, Germany and Switzerland), (iii) Mediterranean (Italy and Spain).

Notes: ***,** and * indicate significance at 1%, 5% and 10%, respectively.

Table 3 Results of panel negative binomial regression by Welfare Regime, with outcome variable the number of GP visits

	Full sample			Social-democratic			Continental			Mediterranean		
	β	z		β	z		β	z		β	z	
Socio-demographic factors												
Female	0.163	14.31	***	0.125	4.81	***	0.149	10.22	***	0.208	9.10	***
60-69 years	0.114	6.72	***	0.027	0.65		0.088	4.02	***	0.191	5.85	***
70-79 years	0.249	12.85	***	0.161	3.09	***	0.218	8.81	***	0.302	8.59	***
≥ 80 years	0.317	13.68	***	0.280	4.72	***	0.351	11.98	***	0.306	7.18	***
Native	-0.018	-0.80		-0.007	-0.12		0.018	0.73		0.063	0.76	
Mideduc	-0.079	-6.14	***	0.208	6.59	***	-0.055	-3.37	***	-0.053	-1.68	*
Higheduc	-0.099	-6.92	***	0.169	5.18	***	-0.019	-1.04		-0.227	-4.70	***
Retired	0.034	2.55	***	0.103	2.73	***	0.055	3.06	***	0.076	3.20	***
Rural	0.063	5.65	***	-0.041	-1.59		-0.020	-1.37		0.009	0.41	
Health factors												
MCCs	0.592	37.64	***	0.550	14.95	***	0.584	28.86	***	0.591	22.03	***
Social isolation measures												
Alone	0.025	2.06	**	0.052	1.84	*	0.020	1.29		0.022	0.88	
Help	-0.088	-7.19	***	-0.057	-2.14	**	-0.029	-1.90	*	-0.037	-1.32	
Constant	0.912	12.10	***	0.833	7.68	***	1.085	13.84	***	0.097	0.97	
Observations	31,381			6,815			16,557			8,009		

Source: Authors' calculations based on easySHARE release 6.1.0 (Waves 1 to 6: 2004-2015). Population aged ≥ 50. Welfare Regime: (i) Social-democratic (Denmark and Sweden), (ii) Continental (Austria, Belgium, France, Germany and Switzerland), (iii) Mediterranean (Italy and Spain).

Notes: ***,** and * indicate significance at 1%, 5% and 10%, respectively.

Table 4 Results of dynamic panel negative binomial regression (full sample), with outcome variable the number of GP visits

	Full sample		
	β	**z**	
GP $_{t-1}$	0.005	7.94	***
Socio-demographic factors			
Female	0.168	14.60	***
60-69 years	0.104	6.09	***
70-79 years	0.239	12.25	***
≥ 80 years	0.325	13.90	***
Native	-0.047	-2.09	**
Mideduc	-0.018	-1.33	
Higheduc	-0.032	-2.07	**
Retired	0.058	4.23	***
Rural	0.064	5.69	***
Health factors			
MCCs	0.591	37.22	***
Social isolation measures			
Alone	0.044	3.56	***
Help	-0.066	-5.30	***
Welfare Regime			
Mediterranean	0.188	13.30	***
Constant	0.921	10.25	***
Observations	31,217		

Source: Authors' calculations based on easySHARE release 6.1.0 (Waves 1 to 6: 2004-2015). Population aged ≥ 50. Welfare Regime: (i) Social-democratic (Denmark and Sweden), (ii) Continental (Austria, Belgium, France, Germany and Switzerland), (iii) Mediterranean (Italy and Spain).

Notes: ***,** and * indicate significance at 1%, 5% and 10%, respectively.

Table 5 Results of dynamic panel negative binomial regression by Welfare Regime, with outcome variable the number of GP visits

	Full sample			Social-democratic			Continental			Mediterranean		
	β	z		β	z		β	z		β	z	
GP $_{t-1}$	0.006	10.48	***	0.001	0.34		0.002	2.89	***	0.002	2.67	***
Socio-demographic factors												
Female	0.165	14.37	***	0.126	4.84	***	0.150	10.22	***	0.208	9.07	***
60-69 years	0.113	6.66	***	0.033	0.80		0.088	4.02	***	0.188	5.74	***
70-79 years	0.249	12.83	***	0.163	3.14	***	0.220	8.84	***	0.299	8.47	***
≥ 80 years	0.318	13.69	***	0.284	4.76	***	0.351	11.96	***	0.305	7.12	***
Native	-0.022	-0.97		-0.013	-0.22		0.015	0.60		0.067	0.81	
Mideduc	-0.076	-5.92	***	0.203	6.44	***	-0.054	-3.32	***	-0.054	-1.72	*
Higheduc	-0.096	-6.68	***	0.171	5.22	***	-0.020	-1.10		-0.229	-4.72	***
Retired	0.035	2.60	***	0.105	2.79	***	0.054	3.03	***	0.074	3.11	***
Rural	0.060	5.36	***	-0.041	-1.57		-0.020	-1.37		0.009	0.42	
Health factors												
MCCs	0.593	37.67	***	0.551	14.94	***	0.584	28.86	***	0.593	22.04	***
Social isolation measures												
Alone	0.027	2.16	**	0.053	1.88	*	0.020	1.31		0.022	0.88	
Help	-0.086	-6.99	***	-0.056	-2.09	**	-0.028	-1.87	*	-0.039	-1.38	
Constant	0.893	11.72	***	0.830	7.63	***	1.071	13.64	***	0.077	0.77	
Observations	31,219			6,785			16,482			7,952		

Source: Authors' calculations based on easySHARE release 6.1.0 (Waves 1 to 6: 2004-2015). Population aged ≥ 50. Welfare Regime: (i) Social-democratic (Denmark and Sweden), (ii) Continental (Austria, Belgium, France, Germany and Switzerland), (iii) Mediterranean (Italy and Spain).

Notes: ***,** and * indicate significance at 1%, 5% and 10%, respectively.