THE IMPACT OF MULTIMORBIDITY PATTERNS IN HEALTH CHANGES OVER TIME AMONG OLDER EUROPEANS. APPROACHING THE GENDER DIVERGENCES.

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Abstract

Multimorbidity is associated with higher risk of premature deaths and higher prevalence of function loss, disability and deterioration of general health in old age. We aim at understanding the differential impact of multimorbidity on the deterioration of health in older men and women in Europe, using the Survey of Health, Ageing and Retirement in Europe (SHARE) data. Latent class analysis will be used to construct multimorbidity patterns and logistic regressions will be applied to explore the relationship between multimorbidity and changes in health over time among males and females aged 70 and older. Longitudinal approaches to multimorbidity of older adults and its effects over health status are critical from the practical, clinical and policy point of view, given the implications that the concomitance of chronic conditions have for the wellbeing in very older ages.

Keywords: multimorbidity, Europe, SHARE, health status, longitudinal perspective.

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Introduction

Extensive research has evidenced that the concomitance of chronic conditions is a key determinant of health and wellbeing in old age. Older people with multimorbidity present significantly lower scores in the wide range of health and wellbeing indicators: from health-related QoL indexes to more general measures as self-perceived health, life satisfaction, social connectedness or happiness (Galenkamp, Braam, Huisman, & Deeg, 2011; Stickley & Koyanagi, 2018; Wikman, Wardle, & Steptoe, 2011). The combination of chronic conditions triggered by cerebrovascular diseases, chronic respiratory diseases, musculoskeletal diseases and neurodegenerative/neurocognitive provoke a deterioration in the health status of older people (Galenkamp et al., 2004; Kojima et al., 2016; Sprangers et al., 2000), as well as the so-called "secondary conditions" associated to chronic illnesses; fatigue, pain, unintentional weight loss, mobility and sleep problems, etc. (Forte et al., 2019; Widerström-Noga & Finlayson, 2010). In addition, there are insights about the cumulative negative impact that multimorbidity has on perceived health; as the higher the number of chronic conditions the worse is the evaluation of the health status (Galenkamp et al., 2011).

Multimorbidity particularly undermine the perception about health status when it implies the co-occurrence of physical and mental chronic conditions, especially depressive symptoms (Sivertsen, Bjørkløf, Engedal, Selbæk, & Helvik, 2015) and dementia in the case of older adults in nursing homes (Hoe, Hancock, Livingston, & Orrell, 2006). In fact, multimorbidity involving depression undermines perceived health in a larger extent than when it is only originated by physical chronic illnesses (Noël et al., 2004). Moreover, some studies found that the detrimental effect of this pattern of multimorbidity is observable regardless of the socioeconomic characteristics and lifestyle behaviours of older people (Gallegos-Carrillo et al., 2009; Moussavi et al., 2007). The negative association between multimorbidity and perceived health is particularly observable in older women, because they present a higher prevalence of reported chronic conditions and worse performance-based functional capacity compared to men (Orfila et al., 2006).

Thus far, most studies have approached the effect of multimorbidity on health status from a cross-sectional perspective. However, recent research has emphasized the need for longitudinal approaches that focus on multimorbidity patterns rather than in counts of morbidities (Busija et al., 2019; Northwood, Ploeg, Markle-Reid, & Sherifali, 2018; Collins et al., 2018; Marroig, Čukić, Robitaille, Piccinin, & Terrera, 2019). In line with the works by Marroig et al. (2019), a study of older European individuals that analyses the change over time in both the number of multimorbidity and the number of depression symptoms; and by Sheridan et al (2019), in which a multimorbidity combination based on most prevalent diseases is used to capture the effect of multimorbidity on changes in ADL and self-perceived health; this study aims at identifying the multimorbidity patterns of older adults in Europe by gender, and examining the effect that these patterns have on the changes in the health status independently for men and women.

Overall, our work updates the current evidence on health trends and on the association between multimorbidity and health-related indicators for European older adults, and adds to the existing literature a novelty in the field as, to the best of our knowledge, this is the first study where Latent Class Analysis is used to construct multimorbidity patterns using European SHARE data in the context of very old population. We also distinguish whether there are gender differences in this association.

Objectives and research questions

The objective of this paper is twofold: 1) to examine how multimorbidity patterns affect the evolution of health-related indicators of older adults, and 2) to identify the gender divergences in this association. The questions that this analysis aims to respond are:

1. *What are the multimorbidity patterns of older Europeans and how have these patterns evolved over time?*

2. *How multimorbidity patterns have influenced the health status of older Europeans over time?*

3. *Do multimorbidity patterns affect the changes in health of older men and women in the same way?*

According to the first question, the specific objective of this study is to outline the multimorbidity patterns of older Europeans and to examine the evolution of these patterns across the time. The second objective, in response to the second research question, is to explore the effect that multimorbidity patterns have in the perceived health status and disability status of older adults. The third objective is to examine the divergence of this impact depending on the gender.

Data and Methods

We examine how multimorbidity patterns influence changes in health status of individuals aged 70 to 91 in 20 European countries using data from the Survey of Health, Ageing and Retirement in Europe (SHARE). To measure health-related change over time, two indicators will be used: Self-perceived health and limitations in ADL´s. As for the Self-perceived health, it is one of the main factors related with quality of life at advanced ages and a widely used indicator for predicting mortality (Idler & Benyamini, 1997), whereas ADL items represents the most basic activities involved in every independent function (Verropoulou & Tsimbos, 2017).

Data

This study uses individual-level data from the Survey of Health, Ageing and Retirement in Europe (SHARE), a multidisciplinary longitudinal survey, representative of the non-institutionalized population aged 50 and over (Börsch-Supan et al., 2013). All individuals aged at least 50 in the selected households were interviewed, as well as their partners independent of their age.

Our work is based on data from the first to the seventh wave of SHARE conducted between 2004 and 2017 (excluding wave 3). We restricted our analyses to women and men aged 70 to 91 years old who were interviewed at least twice (maximum in six waves) in 20 European countries (Austria, Belgium, Croatia, Czech Republic, Denmark, Estonia, France, Greece, Germany, Hungary, Israel, Italy, Luxembourg, the Netherlands, Poland, Portugal, Spain, Slovenia, Sweden and Switzerland). Individuals below aged 70 were excluded because prior studies have found a higher prevalence of multimorbidity from these ages onwards (Chatterji et al., 2015) and while many have included a wider range of ages at older groups such as 60+ or 65+, others have emphasized the need for studying vulnerable subgroups of the population such as the very old (Busija et al., 2019). Table 1 provides the sample size to visualize our sample selection for older men and women by country. The final sample is composed of 110,705 cases (56 % women).

Table 1. Sample size selected by country and number of waves observed.

Country	2	3	4	5	6	Total
Austria	1,011	1,412	3,463	582	923	7,391
Germany	1,127	2,962	272	835	1,174	6,37
Sweden	1,173	2,641	851	1,488	1,969	8,122
Netherlands	849	779	1,315	0	0	2,943
Spain	1,738	3,275	2,405	1,609	1,957	10,984
Italy	1,34	1,735	1,574	1,464	2,282	8,395
France	1,271	1,434	2,758	1,258	1,436	8,157
Denmark	708	1,491	587	1,371	1,182	5,339
Greece	1,574	1,044	1,828	0	0	4,446
Switzerland	503	693	2,282	819	888	5,185
Belgium	1,503	1,646	1,987	1,161	3,007	9,304
Israel	492	759	1,603	1,608	0	4,462
Czech Republic	903	2,055	3,33	1,629	0	7,917
Poland	325	457	1,435	0	0	2,217
Luxembourg	428	703	0	0	0	1,131
Hungary	983	0	0	0	0	983
Portugal	826	412	0	0	0	1,238
Slovenia	1,417	1,396	2,164	0	0	4,977
Estonia	1,067	1,903	6,882	0	0	9,852
Croatia	1,292	0	0	0	0	1,292
Total	20,53	26,797	34,736	13,824	14,818	110,705

Source: SHARE data (waves 1-7, excluding wave 3).

Note: selection based on participation of at least two waves out of six.

Health outcomes

Health measures are based on self-reports of health problems in the SHARE surveys. In most countries, questions worded were harmonized in order to be comparable. We use two indicators of health problems including self-perceived health (Excellent, very good and good versus fair and poor) and difficulty doing at least one of six activities of daily living (ADLs), which represent the ability to provide self-care. Information on ADL functions is obtained from the following question: *"Please tell me if you have any difficulty with these because of a physical, mental, emotional or memory problem. Again, exclude any difficulties you expect to last less than three months"*. Answers include walking across a room, getting in and out of bed, bathing or showering, eating (such as cutting up your food), dressing (including putting on shoes and socks) and using the toilet (including getting up or down). Table 2 shows how prevalent is the health deterioration (SPH and ADL limitations) among the individuals aged 70 and over in our sample.

Table 2. Change in health status between two consecutive waves (t_0 and t_1).

		Self-perceived health (t_1)		
		Good to excellent	Fair-Poor	Total
Good to Excellent Self-perceived health (t_0)	Men	12,145	4,804	16,949
		71.66	28.34	100.00
	Women	12,784	5,776	18,560
		68.88	31.12	100.00
		Limitations in ADL (t_1)		
		No limitations	At least one	Total
No ADL limitations (t_0)	Men	22,786	3,177	25,963
		87.76	12.24	100.00
	Women	27,024	4,678	31,702
		85.24	14.76	100.00

Source: SHARE data (waves 1-7, excluding wave 3).

Control variables and predictors

We will use multimorbidity patterns as a predictor of health deterioration. In SHARE, participants were asked if the doctor ever told them that they had: a heart attack, high blood pressure or hypertension, high cholesterol, a stroke or cerebral vascular disease, diabetes or high blood sugar, chronic lung disease, cancer or malignant tumour, stomach or duodenal ulcer, peptic ulcer, Parkinson disease, cataracts, hip fracture or femoral fracture. Table 3 shows how prevalent is having two or more of these conditions among the population under study.

Table 3. Percentage of cases with two or more chronic conditions (absolute numbers in parenthesis)

Chronic conditions	Male (48,638)	Female (62,067)	Total (110,705)
None	41.68	33.68	37.19
2 or more	58.32	66.32	62.81
Total	100.00	100.00	100.00

Source: SHARE data (waves 1-7, excluding wave 3.

In all multivariate analyses we control for a set of variables that in previous studies have been found to be related to health outcomes and therefore may confound the association under study (Quiñones et al., 2018; Sheridan, Mair, & Quiñones, 2019). Socio-demographic control variables will include variables such as age; marital status (married or in a partnership (reference) versus not in a partnership); education (lower secondary or less (reference), higher secondary, and tertiary) and controls for country of residence.

Statistical analysis

To address our research aims described in the previous section, we are planning to follow three steps in our analytical strategy. First, we will perform a descriptive analysis that shows the mean number of morbidities, ADLs and percentage of those in fair/poor self-perceived health for men and women in each of the six waves under observation.

Second, we will use the pooled data of the six waves to apply latent class analysis (LCA) to create our multimorbidity classes. In previous studies it has been recognised the utility of using LCA to construct multimorbidity profiles (Busija et al., 2019). Latent classes are conceptualised as discrete pathological processes, with individuals having high or low probability of belonging to a given latent class. Classes then are formed in the basis of probability of co-occurrence of various chronic conditions.

Third, we will apply binomial logistic regression indicating the likelihood of health deterioration (between two consecutive waves) independently for men and women. We compute the models first with the predictors only, then adding controls for socio-demographic covariates to analyse differences among sexes and morbidity patterns according to socio-demographic, lifestyle, clinical, and functional characteristics. Further analysis will desegregate Europe according to geographic regions.

References

Busija, L., Lim, K., Szoeke, C., Sanders, K. M., & McCabe, M. P. (2019). Do replicable profiles of multimorbidity exist? Systematic review and synthesis. *European Journal of Epidemiology*. https://doi.org/10.1007/s10654-019-00568-5

Chatterji; Byles; Cutler; Seeman; Verdes E. (2015). Health, functioning, and disability in older adults—present status and future implications, *The Lancet,* vol: 385 (9967) pp: 563-575

Collins, D. M., Downer, B., Kumar, A., Krishnan, S., Li, C. ying, Markides, K. S., & Karmarkar, A. M. (2018). Impact of multiple chronic conditions on activity limitations among older Mexican-American care recipients. *Preventing Chronic Disease*, *15*(5). https://doi.org/10.5888/pcd15.170358

Fortin, M., Hudon, C., Haggerty, J., Akker, M. Van Den, & Almirall, J. (2010). Prevalence estimates of multimorbidity: A comparative study of two sources. *BMC Health Services Research*, *10*. https://doi.org/10.1186/1472-6963-10-111

Galenkamp, H., Braam, A. W., Huisman, M., & Deeg, D. J. H. (2011). Somatic Multimorbidity and Self-rated Health in the Older Population. The Journals of Gerontology: Series B, 66B(3), 380-386. doi:10.1093/geronb/gbr032

Marroig, A., Čukić, I., Robitaille, A., Piccinin, A., & Terrera, G. M. (2019). Importance of modelling decisions on estimating trajectories of depressive symptoms and co-morbid conditions in older adults: Longitudinal studies from ten European countries. *PLoS ONE*, *14*(4). https://doi.org/10.1371/journal.pone.0214438

Northwood, M., Ploeg, J., Markle-Reid, M., & Sherifali, D. (2018, January 1). Integrative review of the social determinants of health in older adults with multimorbidity. *Journal of Advanced Nursing*, Vol. 74, pp. 45–60. https://doi.org/10.1111/jan.13408

Quiñones, A. R., Markwardt, S., Thielke, S., Rostant, O., Vásquez, E., & Botoseneanu, A. (2018). Prospective disability in different combinations of somatic and mental multimorbidity. *Journals of Gerontology - Series A Biological Sciences and Medical Sciences*, *73*(2), 204–210. https://doi.org/10.1093/gerona/glx100

Sheridan, P. E., Mair, C. A., & Quiñones, A. R. (2019). Associations between prevalent multimorbidity combinations and prospective disability and self-rated health among older adults in Europe. *BMC Geriatrics*, *19*(1). https://doi.org/10.1186/s12877-019-1214-z

Stickley, A., & Koyanagi, A. (2018). Physical multimorbidity and loneliness: A population-based study. *PLOS ONE, 13*(1), e0191651. doi:10.1371/journal.pone.0191651

Wikman, A., Wardle, J., & Steptoe, A. (2011). Quality of Life and Affective Well-Being in Middle-Aged and Older People with Chronic Medical Illnesses: A Cross-Sectional Population Based Study. *PLOS ONE, 6*(4), e18952. doi:10.1371/journal.pone.0018952