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All-cause mortality and multimorbidity in older adults: The role of social support and loneliness

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ABSTRACT

Objectives: To determine whether the effect of multimorbidity on time to mortality is modified by level of social support and loneliness in a representative sample of 2113 participants aged 60 + .

Methods: Vital status was ascertained through national registers or by asking participants' relatives. Baseline variables included number of illnesses, self-perceived social support (Oslo social support scale) and loneliness (UCLA loneliness scale). Kaplan-Meier survival curves were used to estimate the time to death by multimorbidity, social support and loneliness. Adjusted cox proportional hazards regression models were conducted to explore interactions between multimorbidity and social support and loneliness.

Results: Multimorbidity was associated with low probability of survival, whereas high loneliness and low social support were not related with time to death. Only the interaction multimorbidity * social support was significant. Participants with low social support and 2 chronic diseases, compared with none, presented lower probability of survival (HR = 2.43, 95%CI = 1.14–5.18, $p < 0.05$), whereas the effect of multimorbidity, in comparison with not having chronic conditions, did not affect mortality if participants had high social support. For participants with low social support, there were no differences between having one, two or more than two diseases. When there is high social support, the probability of death is significantly lower if one or two chronic diseases are present, compared with more than two.

Discussion: These findings indicate that having a supportive social environment increases the survival of people with physical illnesses, especially those with one or two. For those with more than two illnesses, survival remains unchanged regardless of the level of social support and other protective factors should be explored in future research. Geriatric health professionals are encouraged to evaluate social relationships and stimulate support given by relatives, friends or neighbors.

1. Introduction

Multimorbidity, defined as the presence of two or more chronic conditions, is especially common among older adults, affecting at least 60% (Marengoni et al., 2011). Its negative consequences include higher disability, decrease in quality of life and increased risk of death (Marengoni et al., 2011; de Mello et al., 2014). In a recent meta-analysis, the pooled mortality risk for elderly people with multimorbidity was 1.44 (95%CI: 1.34–1.55), compared with those with one chronic disease or none (Nunes et al., 2016). The literature shows that there is a positive gradient between the number of conditions and mortality, with 3 or more diseases being strongly associated with death (Nunes et al., 2016). Several factors, such as complications derived from interactions between illnesses and drugs (Calderón-Larrañaga et al., 2012), fragmented care (Veras et al., 2014) or an increase in disability, frailty and a decrease in quality of life, might contribute to this augmented risk of dying (Nunes et al., 2016).

Social factors, such as social support and loneliness, have also been associated with mortality in the elderly, with an overall effect size corresponding to a 50% increase in probability of survival for people

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with stronger social relationships (Holt-Lunstad et al., 2015, 2010). Social support refers to the quality and functions of social relationships and usually includes perceived availability of help or received support. It can be related to the perception of reciprocity, a sense of obligation, and altruism (Schwarzer and Leppin, 1991). There are two main hypotheses on how social support might impact one's health status; the stress buffering hypothesis, which suggests that social relationships can provide resources that buffer the negative effect of stress on health (Uchino, 2004); and the direct effect model, which proposes that social environments can help regulate health behaviors and access to health care by providing informal resources (e.g., economic assistance, transportation) (Penninx et al., 1997). On the other hand, loneliness reflects one's dissatisfaction with the frequency and closeness of social contacts (Peplau and Perlman, 1982). This subjective feeling of being socially isolated is relatively common among the elderly because some relationships are lost as people get older (e.g., retirement, partner's death) (Dahlberg and McKee, 2014; Luo and Waite, 2014; Netz et al., 2013). In a cross-national European study, it was found that 11.4% of people aged 60 years or older in France reported feeling lonely in the previous week compared with 14.9% in Portugal, 7.4% in the United Kingdom, and 11.5% in Spain (Yang and Victor, 2011).

Some authors have hypothesized that when people suffer from physical illnesses (and therefore need more support), the lack of social support could substantially increase their risk of mortality (Holt-Lunstad et al., 2015; Rico-Uribe et al., 2016). Mazzella et al. (2010) investigated the role of comorbid chronic conditions in the effect of social support on time to death in a community sample of older adults, finding that individuals with low social support and multimorbidity presented the lowest survival probability. However, the role of perceived loneliness on the impact of multimorbidity on elderly people's survival has not yet been examined.

Therefore, the aim of the present study was to investigate whether multimorbidity and two components of social relationships, self- perceived social support and loneliness, had a significant impact on the survival of a population-based sample of subjects aged 60 and over. We also aimed to determine whether social support and loneliness moderated the effect of multimorbidity on time to mortality. Based on the existing literature, we hypothesized that low social support, acute feelings of loneliness and greater number of chronic conditions would be significant predictors of mortality in a 3-year follow-up. We also expected to find that the effect of multimorbidity on survival time would be greater among people with low social support and high levels of loneliness compared with those with high social support and no feelings of loneliness.

2. Methods

2.1. Study sample

The current study used data from "*Edad con Salud*", a longitudinal, nationally representative survey of adult, non-institutionalized people in Spain conducted between July 25th, 2011 and May 4th, 2012. The first wave was part of the Collaborative Research on Ageing in Europe (COURAGE in Europe) study (Leonardi et al., 2014). A stratified multistage clustered design was used creating strata according to geographical, administrative and catchment-area sizes. Municipalities and census units were systematically selected with probabilities proportional to the population size. Age strata were used to select households and individuals were randomly selected from inhabitants in a certain age group within the household. Data on households were provided by the Spanish Statistical Office. People over 50 and 80 years old were oversampled. A total of 4753 people participated with a final response rate of 69.9%. This sample was followed-up after approximately 3 years, between December 3rd, 2014 and June 25th, 2015.

The present analysis focused on participants aged 60 or older at baseline (n = 2573). We also excluded those subjects with missing information in one or more of the baseline variables considered in this study, resulting in a final n of 2113. Informed consent was obtained from all participants and ethical approval was granted by the Ethics Review Committees at Hospital Universitario de La Princesa (Madrid) and Parc Sanitari Sant Joan de Déu (Barcelona).

2.2. Measures

The COURAGE questionnaire was administered by lay, trained interviewers using Computer-Assisted Personal Interviewing (CAPI) at respondents' homes. Anthropometric measures and cognitive tests were also performed during the interview.

2.2.1. Chronic physical conditions

Participants were asked whether they had had a medical diagnosis in the previous 12 months of the following physical conditions: arthritis, asthma, chronic obstructive pulmonary disease (COPD), angina, stroke, hypertension, and diabetes. Additional symptom questions were asked to detect undiagnosed cases of arthritis, asthma, stroke, COPD, and angina. Algorithms were implemented in these cases (Garin et al., 2016) and a person was considered to have one of these conditions if he/she fulfilled at least the self-reported diagnosis or the diagnosis made according to symptom criteria. For diabetes, only self-reported diagnosis was considered. The presence of hypertension was also based on the presence of systolic blood pressure ≥ 140 mmHg or diastolic blood pressure ≥ 90 mmHg (Basu and Millett, 2013; Mancia et al., 2013) using the average of two measurements at the time of the interview. Finally, the multimorbidity variable was created as the number of chronic conditions (CC) (0, 1, 2 and 3 or more CC).

2.2.2. Social support

The Oslo social support scale was used to assess social support (Dalgard et al., 2006). It has three items: "*How many people are you so close to that you can count on them if you have great personal problems?"* (4 " > 5", 3 "from 3 to 5", 2 "from 1 to 2", 1 "none");*"How much interest and concern do people show in what you do?"* (5 "a lot", 4 "some", 3 "uncertain", 2 "little", 1 "none"), and *"How easy is it to get practical help from neighbors if you should need it?"* (5 "very easy", 4 "easy", 3 "possible", 2 "difficult", 1 "very difficult"). A composite score was calculated as the sum of the three items, ranging from 3 to 14. Due to its high skewness, the median of the sample was used to categorize people into low (< 12) or high social support (≥ 12) (Perales et al., 2014).

2.2.3. Loneliness

The three-item UCLA Loneliness Scale (Hughes et al., 2004) was used to assess perceived loneliness. The items are: "*How often do you feel that you lack companionship?", "How often do you feel left out?"* and "*How often do you feel isolated from others?"*. Participants answered on a 3-point scale (1 "hardly ever", 2 "some of the time", 3 "often"). A total score was calculated, ranging from 3 to 9. Scores ≥ 6 (90th percentile) were considered as high loneliness (Steptoe et al., 2013).

2.2.4. Other covariates at baseline

Socio-demographic variables at baseline included age, gender, years of education and marital status (single, married or currently cohabiting, separated or divorced, and widowed). Other potential covariates included current tobacco (yes/no), and alcohol consumption (0-lifetime abstainers, 1-occasional drinkers, and 2-frequent drinkers). Episodic verbal memory was used as a measure of cognitive function. Respondents were asked to recall a list of ten words three times immediately and once after a short delay which was filled with other cognitive tests (Consortium to Establish a Registry for Alzheimer's Disease) (Moms et al., 1989). A composite score was computed (from 0 to 40), with higher scores indicating better memory. Participants also reported whether they had been diagnosed with depression in the previous 12 months and answered an adapted version of the World