Maturitas 83 (2016) 45–50

Contents lists available at ScienceDirect

Maturitas

journal homepage: www.elsevier.com/locate/maturitas

Adverse effects of frailty on social functioning in older adults: Results from the Longitudinal Aging Study Amsterdam

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ARTICLE INFO

Article history:
Received 3 July 2015
Received in revised form 20 August 2015
Accepted 14 September 2015

Keywords:
Frail elderly
Social support
Loneliness
Longitudinal study

ABSTRACT

Objectives: The aim of this study was to examine the association between physical frailty and social functioning among older adults, cross-sectionally and prospectively over 3 years.
Study design: The study sample consisted of 1115 older adults aged 65 and over from two waves of the Longitudinal Aging Study Amsterdam, a population based study.
Main outcome measures: Frailty was measured at T1 (2005/2006) using the criteria of the frailty phenotype, which includes weight loss, weak grip strength, exhaustion, slow gait speed and low physical activity. Social functioning was assessed at T1 and T2 (2008/2009) and included social network size, instrumental support, emotional support, and loneliness.
Results: Cross-sectional linear regression analyses adjusted for covariates (age, sex, educational level and number of chronic diseases) showed that pre-frail and frail older adults had a smaller network size and higher levels of loneliness compared to their non-frail peers. Longitudinal linear regression analyses adjusted for covariates and baseline social functioning showed that frailty was associated with an increase in loneliness over 3 years. However, the network size and levels of social support of frail older adults did not further decline over time.
Conclusions: Frailty is associated with poor social functioning, and with an increase in loneliness over time. The social vulnerability of physical frail older adults should be taken into account in the care provision for frail older adults.

1. Introduction

Frailty is a geriatric syndrome involving the loss of reserve capacity in multiple physiological systems, which is associated with adverse outcomes, such as falls, functional decline and mortality [1,2]. To date, research into the adverse effects of frailty has mainly focused on health related outcomes. The effects of frailty on social functioning have received little attention. However, social functioning is important to investigate, given that social networks are crucial for wellbeing in older adults [3]. Social networks may provide support needed to maintain independent living, and to cope with life events such as health decline and widowhood [4]. Moreover, it is possible that frail older adults who also experience a decrease in social functioning are even more vulnerable to adverse health outcomes [5].

Social functioning can be measured by a broad range of structural and functional aspects of social networks. The social network size is an important structural network feature, while receiving social support and the perceived adequacy of support (e.g., the experience of loneliness) are two important functional aspects of the network [6,7]. Our insight into the effects of frailty on social functioning is incomplete. Previous studies on frailty and social functioning have been only cross-sectional and/or have not included both structural and functional aspects of social networks. For example, a cross-sectional study among Mexican older adults did not show any association between frailty and social network characteristics [8]. In another cross-sectional study it was found

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http://dx.doi.org/10.1016/j.maturitas.2015.09.002
0378-5122/

that frail older adults were more likely to have smaller networks, with fewer relatives and neighbors in these networks [9].

Using data from the Longitudinal Aging Study Amsterdam (LASA), the present study examined the association between physical frailty and social functioning among older adults, both cross-sectionally and prospectively over 3 years. Social functioning included network size, instrumental and emotional support received, and loneliness, which cover both structural and functional aspects of social networks.

2. Methods

2.1. Design and study sample

Data are from LASA, an ongoing study on physical, emotional, cognitive and social functioning of older adults in the Netherlands. The sampling procedure and data collection of LASA have been described elsewhere [10]. In brief, a nationally representative survey was conducted in 1992–1993 among 3107 respondents aged 55–85 (birth years 1908–1937). Follow-up measurements are collected approximately every 3 years. Data are collected in a face-to-face main interview and in a separate medical interview (including clinical tests). Both interviews take place in the respondent's home by intensively trained interviewers. In 2002–2003 a new cohort of 55–64 years old (n = 1002, birth years 1938–1947) was added to the study. The LASA study is conducted in line with the Declaration of Helsinki, and was approved by the medical ethics committee of the VU University Medical Center. All study participants signed an informed consent.

For the current study, data were used from two measurement waves of LASA (Timepoint 1, T1 = 2005–2006 and Timepoint 2, T2 = 2008–2009). The analyses were of two types: cross-sectional and longitudinal. The cross-sectional sample consisted of respondents aged 65 and over, who participated in the main interview and the medical interview at T1, who had valid data on frailty and social functioning at T1. The longitudinal sample consisted of respondents still participating at T2 with valid data on social functioning.

2.2. Measures

Frailty was assessed at T1 (baseline) using the criteria of the frailty phenotype proposed by Fried and colleagues [11]. The frailty phenotype includes weight loss, weak grip strength, exhaustion, slow gait speed and low physical activity. We used the original variables and cut-off points [11], except for gait speed and physical activity. For those measures the lowest quintile approach was used [12]. Weight loss was present if a participant lost 5% or more body weight in the previous 3-years (current body weight at T1 compared to the previous LASA measurement wave, T0) [13]. Body weight was measured using a calibrated bathroom scale, with the participants wearing underclothing only. Grip strength was assessed with a handheld dynamometer (Takei TKK 5001, Takei Scientific Instruments, Tokyo, Japan). It was measured in a standing posture with the elbow extended (or seated when the participant was not able to stand). The sum of the highest values of two measurements on each hand was used, and original cut-off points stratified by sex and body mass index were applied to indicate weak grip strength (see Appendix A for details). Exhaustion was measured using two items from the Center for Epidemiologic Studies Depression Scale (CES-D) [14]. The exhaustion criterion was considered present if a participant answered "often" or "most of the time" to the following two statements: "In the last week I felt that everything I did was an effort" and "In the last week I could not get going." Gait speed was assessed by recording the time taken (in seconds) to walk 3 m, turn around, and walk the 3 m back as quickly as possible [15]. Slow gait was defined by the lowest quintile, stratified by sex and height. Finally, physical activity was assessed using the LASA Physical Activity Questionnaire (LAPAQ) [16]. Low physical activity was defined by the lowest quintile of average time spent on physical activities per day during two weeks before the interview. Participants were considered not frail if none of these five criteria were present, as pre-frail if one or two criteria were present, and as frail if three or more criteria were present [11].

Social functioning was assessed at T1 (baseline) and T2, and involved social network size, instrumental support received, emotional support received, and loneliness. The size of the personal network was assessed using the domain-specific network delineation method [17]. With respect to seven role types, respondents were asked to identify people (other than their partner) they had frequent contact with and who were important to them (range 0–75) [18]. For the nine network members they had the most frequent contact with, information was collected on the intensity of instrumental and emotional support (range 0–36) [17]. Higher scores indicate higher levels of support received. Loneliness (i.e. the distressing feeling that one's social relations are deficient in some important way) was assessed by the De Jong Gierveld loneliness scale [19]. The loneliness score ranges from 0 to 11, with higher scores indicating higher levels of loneliness.

Covariates were measured at T1 (baseline) and included age, sex, partner status, educational level and chronic diseases. Partner status indicated whether a respondent had a spouse or partner. Respondents were asked to state their highest level of education on a 9-category scale. We distinguished three groups of educational level: low (elementary school or less), medium (lower vocational or general intermediate education) and high (intermediate vocational education, general secondary school, higher vocational education, college or university). Seven major chronic diseases were assessed by self-report [20]. Respondents were asked whether they currently or previously had one of the following chronic diseases: cardiac disease, peripheral atherosclerosis, stroke, diabetes mellitus, chronic non-specific lung disease (asthma, chronic obstructive pulmonary disease), cancer and arthritis (rheumatoid arthritis or osteoarthritis).

2.3. Statistical analysis

Descriptive analyses were conducted to show the characteristics of the study sample for the cross-sectional and the longitudinal analyses. Chi-square tests and analyses of variance (ANOVA) were performed to determine differences in baseline characteristics by frailty status.

Multiple linear regression analyses were performed to study the association between frailty and social functioning, in both the cross-sectional and the longitudinal sample. First, we performed cross-sectional analyses with baseline social functioning as outcome. Two models were fitted. Model 1 was adjusted for age, sex, educational level. Model 2 was additionally adjusted for the presence of chronic diseases. Second, we investigated the longitudinal association between frailty and social functioning, by using social functioning at T2 as outcome measure. Model 1 was adjusted for age, sex and educational level. In Model 2 we also entered the number of chronic diseases. Finally, Model 3 was adjusted for all variables of the previous models and baseline scores of social functioning. All analyses were performed in SPSS 20 (IBM Corp, Armonk, NY, USA). Statistical significance was set at $p < 0.05$.

3. Results

Fig. 1 shows the flow chart of the study population. There were 2165 participants at T1 in the main interview, of which 1805