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Publication Date

2016-07-01

DOI

10.1016/j.jcomdis.2016.06.002

Peer reviewed



HHS Public Access

Author manuscript

J Commun Disord. Author manuscript; available in PMC 2017 July 01.

Published in final edited form as:

J Commun Disord. 2016 ; 62: 131–146. doi:10.1016/j.jcomdis.2016.06.002.

How Does Difficulty Communicating Affect the Social Relationships of Older Adults? An Exploration Using Data from a National Survey

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Abstract

Healthy social relationships are important for maintaining mental and physical health in later life. Less social support, smaller social networks, and more negative social interactions have been linked to depression, poorer immune functioning, lower self-rated health, increased incidence of disease, and higher mortality. Overwhelming evidence suggests that communication disorders adversely affect social relationships. Much less is known about whether some or all aspects of social relationships are negatively affected by a communication disorder. The relative impact of a communication disorder on social relationships, as compared to other kinds of disability, is also poorly understood. Data were analyzed from a representative national sample of community-dwelling adults aged 65 and older living in the continental United States ($n = 742$). Results from multiple regressions indicated that difficulty communicating was significantly associated with several parameters of social relationships even after controlling for age, gender, partnership status, health, functional limitations, and visual impairment. Communication difficulty was a significant predictor of smaller social network size, fewer positive social exchanges, less frequent participation in social activities, and higher levels of loneliness, but was not a significant predictor of negative social exchanges. These findings suggest that communication disorders may place older adults at increased risk for mental and physical health problems because of social isolation, reduced social participation, and higher rates of loneliness. In addition, it appears that

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Conflict of Interest Statement

The authors of this article have not reported any financial or non-financial conflict of interest.

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communication disorders may have a greater impact on positive, rather than negative, aspects of social relationships.

Keywords

Activities of daily living; Communication; Communication disorders; Disability; Hearing loss; Participation; Social support

1. Introduction

Since Berkman and Syme published their pioneering study linking social relationships to mortality using data on Alameda County residents in 1979, a significant body of evidence has emerged to show that the quantity and quality of an individual's social relationships are associated with better physical and mental health across the life-course (Berkman & Glass, 2000; Cohen, 2004; George, 1989). The absence of social relationships has been shown to predict the likelihood of mortality from almost every cause (Berkman, 1995; Holt-Lunstad, Smith, & Layton, 2010). In addition, an extensive body of literature demonstrates the consistent relationship between social support and better physical health (Berkman, Glass, Brissette, & Seeman, 2000; Uchino, 2004). Individuals with low levels of social support have higher mortality rates, particularly from cardiovascular disease but also from other causes such as cancer and infectious diseases (Uchino, 2006). Social support is related to the risk of hospitalization and institutionalization (Tobin & Kulys, 1981) and also predicts outcomes after rehabilitation, such as levels of disability after a stroke (Kwakkel, Wagenaar, Kollen, & Lankhorst, 1996). Social relationships are also strongly associated with better mental health, particularly lower levels of anxiety, depression, and psychological distress (Kawachi & Berkman, 2001).

Given the diversity and complexity of adult social relationships, researchers have examined a number of different characteristics of interpersonal relationships and the functions that they perform in order to identify which may be the most important for well-being (Berkman & Glass, 2000). A variety of characteristics of social relationships have been described in the literature to date, including social support, positive and negative social exchanges, social isolation, loneliness, social network size, and social participation. "Social support" typically refers to the different beneficial functions that social relationships may perform, which include the provision of emotional support, as well as practical and informational assistance, and a sense of belonging to a social group or community (Uchino, 2006). The term "positive social exchanges" has been used to describe the various positive subtypes of social support, such as emotional support, informational support, and instrumental support. This has been contrasted with a wide variety of negative actions such as personal criticism, intrusiveness, and rudeness, as well as physical and financial abuse, sometimes referred to as "negative social exchanges" (Krause & Jay, 1991). In addition, most authors distinguish between the terms "loneliness" and "social isolation" (de Jong-Gierveld & Havens, 2004). Loneliness is generally considered to refer to individuals' perception that their social relationships are inadequate in some way (e.g., not emotionally close), regardless of the number of social relationships. In contrast, social isolation refers to the objective absence or limited presence

of stable relationships in an individual's social network. The term "social network" refers to the web of social relationships that surround an individual as well as the characteristics of those ties and typically includes relationships with friends, family members, neighbors, work associates, or other important individuals in that person's life (Berkman & Glass, 2000). Finally, "social participation" refers to an individual's engagement in activities with others during which there is a social interaction (Dalemans, de Witte, Lemmens, van den Heuvel, & Wade, 2008). The World Health Organization (2002) has targeted the enhancement of social participation by older adults as part of its policy framework in addressing concerns about population aging. In addition, each of these aspects of social relationships has been shown to be important for maintaining mental and physical health and reducing the risks of institutionalization and mortality (Bassuk, Glass, & Berkman, 1999; Berkman & Glass, 2000; Holt-Lunstad et al., 2010; Kawachi & Berkman, 2001; Tobin & Kulys, 1981; Uchino, 2006).

Studies of communication disorders that are congenital or occur early in life have shown that there are long-term impacts on the formation and maintenance of social relationships across the life-course (McCormack, McLeod, McAllister, & Harrison, 2009). Studies of conditions that occur in mid- to late-life have also shown the social impact of communication difficulties in older adults (Hétu, Jones & Getty, 1993; Yorkston, Bourgeois, & Baylor, 2010). Older adults with communication disorders may be at particular risk for negative consequences since communication is central to the process of successfully adjusting and adapting to the aging process. The ability to communicate effectively is essential for living independently, pursuing personal goals and interests, performing social roles and functions, maintaining personal and familial relationships, making decisions, and exercising control over quality of life and care (Lubinski & Welland, 1997). Studies have shown that the conversational skills of normally aging older adults tend to remain well-preserved, even though the semantic content and syntactic structure of language use change over the life-course (Shadden, 1997). With increasing age, however, there is an increase in the prevalence of conditions that may interfere with communication (Yorkston et al., 2010), such as hearing impairment, dementia, stroke, cancer of the head and neck, traumatic brain injury, and progressive neurological diseases such as Parkinson's Disease (PD) and Amyotrophic Lateral Sclerosis (ALS). In the United States, it has been estimated that 55% of all Medicare beneficiaries have a communication impairment of some kind (Hoffman et al., 2005). Hearing impairment is the most prevalent communication disorder nationally and it is the third most common chronic condition of older adults (Wallhagen, 2002). As the list of medical conditions above suggests, the conditions that cause communication disorders vary widely in their type and severity, as well as in their co-occurrence with other types of disability (Yorkston et al., 2010). It is difficult to make general statements about the impact of a communication disorder, therefore, because many conditions are associated with physical, cognitive, or other limitations that have the potential to profoundly affect social relationships.

Previous research has demonstrated associations between communication disorders and various aspects of social relationships for individuals with a wide variety of conditions. Studies of individuals with PD, ALS, and hearing impairments and their partners have shown that the changes in communication resulting from these conditions are associated

with increased frustration, strain, stress, anger and resentment, reduced marital quality, limitations in family roles and activities, and a restricted social life as a couple (Anderson & Noble, 2005; Carter et al., 1998; Joubert, Bornman, & Alant, 2011; Héту et al., 1993). Communication-related characteristics have also been shown to be significant predictors of reduced social participation in individuals with multiple sclerosis (MS; Baylor, Yorkston, Bamer, Britton, & Amtmann, 2010) and older adults with hearing impairment (Marsiske, Klumb, & Baltes, 1997). Reduced social network size has been documented in stroke survivors (Davidson, Howe, Worrall, Hickson, & Togher, 2008). For survivors of laryngeal cancer, those with poorer communication have been shown to have smaller social networks, less social support, and poorer psychological adjustment (Blood et al., 1994). These studies would suggest that communication disorders of various etiologies negatively impact social relationships in many ways. It has also been shown that there are many commonalities in the experiences of adults with different kinds of communication disorder (Baylor, Burns, Eadie, Britton, & Yorkston, 2011). There are some contradictions in the literature, however. For example, significant associations between hearing loss and loneliness have been found in some studies (Hawthorne, 2008; Kramer, Kapteyn, Kuik, & Deeg, 2002; Strawbridge, Wallhagen, Shema, & Kaplan, 2000; Wallhagen, Strawbridge, & Kaplan, 1996), but not in others (Berg, Mellström, Persson, & Svanborg, 1981; Kivett, 1979; Nachttegaal et al, 2009). In addition, studies of community-dwelling older adults have found either weak or non-significant associations between communication-related variables and social relationship characteristics such as social network size and social participation (Cruice, Worrall, & Hickson, 2005; Hickson, Worrall, Barnett, & Yiu, 1995; Lind et al., 2003). Possible reasons for these discrepancies include differences in study design, instrumentation, and covariates in the analysis, as well as the low prevalence of communication impairments in some study samples.

In individuals with communication disorders, it is unclear to what extent changes in social relationships are the result of the communication impairment itself or should be attributed to other limitations, such as physical disabilities. It is not well-known, for example, whether all social relationship characteristics are affected equally by a communication disorder. Older adults may be at increased risk for negative consequences since they are more likely than other age groups to experience a communication impairment of some kind in addition to co-occurring physical changes and comorbidities (Hoffman et al., 2005; Yorkston et al., 2010). Consequently, there is a need for more research on the impact of a communication impairment on a broad range of social characteristics in older adults (Worrall & Hickson, 2003). Most previous studies have examined one type of communication impairment or a single population (e.g. hearing impairment, stroke, PD, ALS, MS) and the bulk of previous research on the social impact of communication disorders in older adults has focused on hearing impairments. It is also unclear whether these findings can be generalized to older adults with other types of communication impairments. In addition, many studies have been limited by small sample sizes and have not attempted to isolate the relative contribution of the communication impairment itself from other aspects of health and disease. The current study accordingly investigated the following questions: Is communication difficulty (regardless of type or etiology) associated with any characteristic of the social relationships of community-dwelling older adults? If so, is this association significant after controlling for

other health and demographic factors? Finally, are all characteristics of social relationships affected by communication difficulty equally or are some aspects affected disproportionately?

2. Method

2.1. Participants

The data for the current study came from the Later Life Study of Social Exchanges (LLSSE) a study conducted to investigate the mental and physical health consequences of positive and negative aspects of social relationships in a nationally representative sample of older adults (Sorkin & Rook, 2004). Data from this study has been used to analyze the health implications of a variety of social and interpersonal factors, including the impact of positive and negative social exchanges on a range of outcomes such as emotional distress, depressive symptoms, self-rated health, functional disability, and mortality (August, Rook, & Newsom, 2007; Mavandadi, Rook, & Newsom, 2007; Mavandadi, Sorkin, Rook, & Newsom, 2007; Newsom, Mahan, & Rook, 2008; Newsom, Nishishiba, Morgan, & Rook, 2003; Newsom, Rook, Nishishiba, Sorkin, & Mahan, 2005). Survey data were collected over 2 years through a 5-wave longitudinal study. Each wave was separated by 6-month intervals, with abbreviated interviews occurring at waves 2 and 4. Participants were noninstitutionalized, English-speaking, 65-90 years of age, cognitively functional, and living in the contiguous United States. They were recruited from the Medicare Beneficiary Eligibility List, provided by the Centers for Medicare and Medicaid Services (CMS). This list includes the names of all older adults in the United States, even those who do not receive Social Security benefits, with the exception of two groups, namely those 100 years of age and older and also those without a Social Security number. A three-step process was used to draw the sample in the current study. First, 5% of the names in a file maintained by CMS were selected with a simple random-sampling procedure (more than 1.6 million individuals). Second, 98 counties in the contiguous United States were identified as primary sampling units (PSUs), stratified to represent different geographic regions and regions with differing population densities. A particular PSU had a probability of being selected proportionate to the number of people aged 65 or more living within that PSU. Third, potential participants were selected randomly from within each PSU. Prospective participants were sent a letter describing the study and then were contacted either by telephone (when telephone numbers were available) or in person to schedule the initial interview.

Of the 1,924 prospective participants who were identified in this manner and screened for eligibility, 195 were ineligible due to cognitive or health limitations ($n = 118$), being non-English speakers ($n = 48$), or because they were living in a nursing home/long-term care facility ($n = 29$). Of those found to be eligible, 813 individuals (47%) declined to participate and 916 individuals (53%) agreed to take part and were consented for the study. Baseline in-person interviews were conducted by trained interviewers during 2000 and 2001. Follow-up assessments were conducted with in-person interviews annually (waves 3 and 5) and brief telephone interviews midyear (waves 2 and 4). Of the 916 participants recruited at wave 1, a total of 666 remained at wave 5. The current study used data from a single wave of the study (wave 3) because two of the communication-related items (namely those scored by the

interviewer) were included at waves 3 and 5 only. Of these two waves, wave 3 was chosen as it had the larger data-set ($n = 742$). Characteristics of the participants who took part in wave 3 of the study are summarized in Table 1. The participants' average age was 74.91 years ($SD = 6.52$). The majority was female (62%). Approximately half of the participants were married (52%), and the remainder was widowed (34%), divorced (7%), or never married (4%). The race/ethnicity of the participants was as follows: White (83%), Black/African-American (11%), Hispanic (4%), or another ethnic group (2%). Study participants closely resembled the older (65+) U.S. population based on comparisons with the 2000 census data (U.S. Bureau of the Census, 2000).

2.2. Procedure

The sampling and data collection were conducted by Harris Interactive, Inc., a survey research firm with extensive experience conducting public opinion polls, including surveys with older adults. All participants underwent cognitive screening prior to participation using the Short Portable Mental Status Questionnaire (SPMSQ; Pfeiffer, 1975) and those who did not pass were not enrolled in the study. The SPMSQ is a 10-item instrument that has been widely used to screen for cognitive deficits in older adults, such as in the MacArthur Studies of Successful Aging (Glass, Seeman, Herzog, Kahn, & Berkman, 1995; Chodosh, Reuben, Albert, & Seeman, 2002) and the Established Populations for Epidemiologic Studies of the Elderly (White et al., 1994). In a community-based studies of older adults, the SPMSQ has been shown to identify dementia with a positive predictive value of 87% (Pfeiffer, 1975) and it has been shown to have near similar accuracy in correctly classifying older adults who are cognitively intact (Fillenbaum, Heyman, Williams, Prosnitz, & Burchett, 1990). Following screening, in-person interviews lasting an average of 70 minutes were completed during which the participants' demographic characteristics, health status, psychological health, positive and negative social exchanges, and social network ties were assessed.

2.3. Measures

The study included a comprehensive assessment of participants' social relationships, including the size of their social networks, the frequency of positive and negative social exchanges experienced, the frequency of social participation, and loneliness. In addition, information was collected regarding the respondents' sociodemographic, psychosocial, and health-related characteristics, as described in greater detail below.

2.3.1. Predictors of social relationship characteristics

2.3.1.1. Demographic characteristics: Demographic characteristics including age, sex (0 = male, 1 = female), and marital status were used as covariates in the analyses. With regard to marital status, a preliminary analysis was performed to determine how best to group the participants for the regression analysis. A one-way analysis of variance was performed to determine whether there were significant differences for any of the five social outcomes of interest by marital status. Post-hoc testing using Tukey's Honest Significant Difference demonstrated significant differences in social network size and social participation between those who were married and those who were widowed. Loneliness also differed significantly between those who were married and those who were divorced, and between those who were

married and those who were widowed. Consequently, in the interests of parsimony and given the relative small numbers of individuals in some groups, the six marital status categories were recoded. Dummy coding was used by creating two variables, namely being single (1 = divorced, separated, or never married, 0 = not) and widowed (1 = widowed, 0 = not).

2.3.1.2. Health and functional limitations: Three dimensions of health were assessed: self-rated health, the number of health conditions, and functional limitations. Self-rated health was measured using the commonly-used single item “How would you describe your health at the present time? Would you say it is excellent, very good, good, fair or poor?” (0 = poor, 4 = excellent). The number of health conditions was assessed by asking participants, “Have you ever been told by a doctor or other health professional that you have...” any of 12 common conditions (e.g. arthritis or rheumatism, diabetes, stroke; 1 = yes, 0 = no). Functional limitations were measured using 14 questions relating to activities of daily living (e.g. bathing), instrumental activities of daily living (e.g. preparing own meals), upper extremity strength (e.g. grasping objects), and mobility (e.g. climbing stairs). Participants rated on a 4-point scale (0 = not at all difficult, 3 = very difficult) how difficult it was for them to engage in each activity. The 14 items were averaged to create a global measure of functional limitations (Cronbach’s $\alpha = .92$). One instrumental activity of daily living item was deliberately excluded from the calculation, namely telephone use, as this was used to calculate the communication impairment variable (below).

2.3.1.3. Visual impairment: The degree of visual impairment was based on a 3-point scale rated by the interviewer at the conclusion of the 70-minute face-to-face interview: “How much difficulty did the respondent have seeing [even with glasses]?” (0 = very little or no difficulty, 1 = some difficulty, 2 = a great deal of difficulty). This was recoded into a binary variable (0 = very little or no difficulty, 1 = some or a great deal of difficulty).

2.3.1.4. Communication difficulty: It was anticipated that problems with spoken verbal communication would be most likely to have a negative impact on interpersonal social interactions. Consequently, a communication score was created using three communication-related survey items. These three items were chosen because they relate to the ability to hear and comprehend spoken language and to generate an intelligible response in a timely manner. The first item, assessing difficulty using the telephone, was self-reported from the instrumental activities of daily living questionnaire. Participants used a four-point scale (0 = not at all difficult, 4 = very difficult) to rate: “How difficult is it for you to use the telephone?” The other items were rated by the interviewer at the conclusion of the 70-minute face-to-face interview. The second item related to the participant’s ability to respond to questions during the interview: “Respondent’s comprehension of questions” (0 = slow to understand, had difficulty answering, 1 = could understand but answered slowly, 2 = alert and answered quickly). The third item related to the participant’s ability to hear during the interview: “How much difficulty did the respondent have hearing [even with a hearing aid]?” (0 = very little or no difficulty, 1 = some difficulty, 2 = a great deal of difficulty). As the study participants had not been formally diagnosed with a communication disorder, the more general term “communication difficulty” (CD) was chosen and has been used throughout the article. For the purposes of the study, CD was operationally defined as: “Any difficulty with

interpersonal communication, either face-to-face or over the telephone, as reported by individuals themselves or a trained interviewer.” Although not formally assessed, the measure was intended to provide a global index of several aspects of communication ability including hearing, receptive and expressive language abilities, cognitive processing, and speech generation.

A summary CD score was created using the three items listed above. Because different scales were used, scores were first transformed so that all three measures were rated from 0-2 with higher scores indicating greater difficulty. The scores were then averaged across the three items to create a mean score for each participant. The internal reliability for the CD score was lower than ideal for a survey measure. Typically values of Cronbach’s alpha over .70 are considered acceptable but the value for the CD score was .57. Consequently, given the relatively low alpha value, a number of further analyses were performed. First, the association between the three items was examined. As shown in Table 2, the correlations among the three communication items were significant but low, ranging from .20 to .38. This suggested that individuals who had difficulty in one communication area did not necessarily have difficulty in all three. The correlations between the combined CD score and the individual items was significant and was .72 or greater for all three. Then correlations between each of the three individual communication items and the combined CD score on one hand, and the five outcomes of interest on the other hand, were also calculated, as shown in Table 3. Of the five outcomes of interest, self-reported difficulty with telephone use was significantly correlated with three measures, interviewer-reported difficulty responding to questions was significantly correlated with all five, and interviewer-reported difficulty hearing significantly correlated with two. The combined CD score was significantly correlated with four of the five outcomes and, with one exception (namely the frequency of negative social exchanges), it was more strongly associated with each of the outcomes of interest. There are a number of reasons for a low value of alpha, such as a small number of items for a measure, low intercorrelations among items, or when a single construct does not underlie the set of items (Tavakol & Dennick, 2011). In this case, the small number of items and the fact that the CD score was, by design, a complex measure designed to capture multiple aspects of spoken communication may have caused the low alpha value. We chose to use the total CD score which aggregated the three items in order to have the broadest summary of difficulties available for the subsequent analyses.

2.3.2. Social relationship characteristics—Five characteristics of the participants’ social relationships were examined, namely social network size, the frequency of positive and negative social exchanges, social participation, and loneliness. Each of these characteristics is described in greater detail below and the individual survey items are listed in Appendix A.

2.3.2.1. Social network size and membership: A two-step process was used to identify social network members who functioned as sources of positive and negative social exchanges in the life of each participant, and this information was then used to calculate the total network size using a method adapted from McCallister and Fischer (1978). First, the participants were asked about the frequency with which they had experienced various

positive and negative social exchanges in the past month (as described below). For each positive or negative domain in which social exchanges had occurred during the past month, participants were then asked to identify the specific individuals with whom these exchanges had occurred. This network-elicitation process was repeated for each of the domains of positive and negative exchanges. Following the initial elicitation of these names, respondents were then also asked to list the names of any individuals who were “important in their life” as well as the name of anyone who “sometimes upsets or disappoints you.” The names of all individuals identified during the network-elicitation process were recorded and then summed (up to a maximum of sixteen individuals) to reflect overall social network size.

2.3.2.2. Frequency of positive and negative social exchanges: A total of 24 items assessed participants’ positive and negative exchanges with members of their social network (Newsom et al., 2003). The measure had three items to assess each of four common domains of positive social exchanges: informational support, instrumental support, companionship, and emotional support. Typical questions related to the provision of advice, practical assistance, good company, kindness, and consideration. Similarly, four domains of negative social exchanges were also assessed with three items per domain. These included questions relating to others’ insensitive or critical behavior, rejection or neglect, failure to provide tangible support in times of need, and unwanted or unsound advice. Participants rated on a five-point scale (0 = never, 4 = very often) how often they had experienced that type of social exchange during the past month. Mean totals for positive and negative social exchanges were then computed.

2.3.2.3. Participation in social activities: The frequency of participation in recreational social activities was assessed using items from the Social Disengagement Index (Bassuk et al., 1999). Respondents were asked to report their frequency of participation in a range of different types of activities over the course of the previous month (0 = never or almost never, 5 = daily). The items included questions relating to attending meetings of clubs or groups, getting together or talking on the phone with friends and family members, hobby activities, playing cards or games, going out to movies, restaurants and sporting events, volunteering, going out shopping, and day or overnight trips. A summary score was created by averaging the nine items (Cronbach’s $\alpha = .63$). The alpha value for this measure was slightly lower than the commonly used minimum value of .70. Attempts to improve the score by item reduction and factor analysis with 7-item and 5-item versions of the score produced a decrease in the alpha value, however. Consequently, the original 9-item version was retained and used in the regression analysis, consistent with its use in other studies of older adults (de Leon, Glass, & Berkman, 2003). The lower alpha value likely indicates that there is some heterogeneity in the types of social activities that older adults choose to participate in.

2.3.2.4. Loneliness: Loneliness was assessed with six items from the UCLA Loneliness Scale (Russell, 1996) relating to feelings of isolation, companionship, being known or understood, belonging to a group of friends, and the meaningfulness of one’s relationships. Each item was rated on a five-point scale (0 = never, 4 = often) and the six items were then summed to obtain a total score (Cronbach’s $\alpha = .71$).

2.4. Statistical analysis

Data were analyzed using SPSS, version 19 (IBM Corp., 2010). To evaluate the differences between individuals with and without CD, two-tailed independent samples *t*-tests were used for continuous variables and chi-squared analyses for frequency variables. Individuals were subdivided into two groups based on their CD score, (0 = “No CD”, >0 = “CD”). Subsequently, five simultaneous multiple regression analyses were conducted in order to determine whether CD was a significant predictor of any of the social relationship characteristics examined (i.e. social network size, frequency of positive and negative exchanges experienced, frequency of participation in social activities, and loneliness), after controlling for demographic, health, and disability characteristics. Simple bivariate correlations for the predictor variables and outcomes of interest were calculated. All predictor variables significantly correlated with one or more of the outcomes of interest were subsequently included in the regression model. Model fit was analyzed with an overall regression *F* statistic. Regression diagnostics were performed. Variance inflation factor analyses were inspected for values above 10 which would indicate problematic levels of multicollinearity (Cohen, Cohen, West & Aiken, 2003). In addition, histograms of residuals were plotted to ensure that the assumption of normality of residuals was not violated. When outliers were identified, the regression results were recalculated with the outliers removed. If the results were unchanged by the removal of the outliers, the original results were reported, as proved to be the case in all instances.

3. Results

In terms of health and disability characteristics, the mean score for self-rated health was 2.07 (SD = 1.07) as shown in Table 1. The number of previously-diagnosed health conditions ranged from 0-11 with an average of 2.23 (SD = 1.61). The majority of the sample (80%) reported three or fewer health conditions. The most commonly reported conditions were arthritis (58%) and high blood pressure (58%). With regard to functional limitations, the mean score was 0.63 (SD = 0.64) and scores ranged from 0-3. Visual impairment was found to be present in 10% of the sample with 7% having “some difficulty seeing even with glasses” and 3% having “great difficulty.” With regard to the CD variables, 6% of the respondents reported having some difficulty with phone use, 7% had difficulty hearing questions during the interview (even with a hearing aid), and 16% had difficulty comprehending and responding to questions during the interview. The mean CD score for all study participants was 0.11 (SD = 0.26) and ranged from 0-2. The majority of the sample (78%) experienced no difficulty in any of the three areas (mean score = 0), some difficulty was experienced by 21% (mean score > 0 and < 1) and the greatest level of difficulty by 1% of the study sample (mean score > 1).

3.1. Comparison of those with and without CD

Initial analyses compared the demographic, health-status, and social-relationship characteristics of those with and without CD, as summarized in Table 1. With respect to demographic characteristics, only age differed significantly between the two groups. Those with CD were significantly older than those without a communication impairment ($p < .001$). Several group differences in health status emerged, as well. Those with CD had

significantly poorer health, as demonstrated by worse self-rated health ($p < .001$), more health conditions ($p < .001$), greater functional limitations ($p < .001$), and higher levels of visual impairment ($p < .001$) than those without CD.

All of the five measures of social relationships differed significantly between the two groups. Individuals with CD had smaller social networks ($p < .001$), fewer positive social exchanges ($p < .05$), and more negative social exchanges ($p < .05$) than those without CD. Participation in social activities was significantly lower among those with CD than those without ($p < .001$). Finally, loneliness scores were significantly higher among those with CD compared to those without CD ($p < .001$).

3.2. Results of regression analyses

Correlations between the five social variables are presented in Table 4. In addition, simple bivariate correlations for the predictor variables and outcomes of interest were calculated (Table 5). As discussed above, there were significant differences between older adults with and without CD with regard to age, self-rated health, number of health conditions, functional limitations, and visual impairment. Previous research has shown that demographic, health, and disability characteristics are significant predictors of key aspects of the social relationship of older adults (de Jong-Gierveld & Havens, 2004; Dugan & Kivett, 1994; Grenade & Boldy, 2008; Mugford & Kendig 1987). Even though gender and marital status did not differ significantly between the two groups, this was not necessarily considered a reason to exclude them from the analysis (Cohen et al., 2003). As these variables were significantly associated with some of the social outcomes of interest (Table 5), and are known to predict social relationship characteristics from previous research with older adults, they were included as covariates in the analysis. A total of five simultaneous multiple regression analyses were conducted in order to determine whether CD was a significant predictor of the social relationship characteristics of interest, after controlling for demographic, health, and disability characteristics. Each model included the following eight covariates: age, gender, being single, being widowed, self-rated health, number of health conditions, functional impairment, and visual impairment, as shown in Table 6.

3.2.1. Social network size—Four variables significantly predicted the size of the social network. A larger social network was associated with being younger ($p = .002$), not being widowed ($p = .031$), having more health conditions ($p = .015$), and having lower levels of CD ($p = .045$), $R^2 = .062$, $F(9,569) = 4.181$, $p < .001$.

3.2.2. Frequency of positive social exchanges—Three variables significantly predicted the frequency of positive social interactions in the preceding month. More frequent positive interactions were associated with being younger ($p = .006$), being female ($p = .032$), and having lower levels of CD ($p = .005$), $R^2 = .046$, $F(9,703) = 3.726$, $p < .001$.

3.2.3. Frequency of negative social exchanges—Three variables significantly predicted the frequency of negative social interactions in the preceding month. More frequent negative interactions were associated with being younger ($p < .001$), being single (p

= .014), and having more functional limitations ($p < .001$), $R^2 = .085$, $F(9,694) = 7.167$, $p < .001$.

3.2.4. Frequency of participation in social activities—Five variables significantly predicted the frequency of participation in social activities in the preceding month. More frequent social participation was associated with being female ($p < .001$), having better self-rated health ($p < .001$), having more health conditions ($p < .001$), having fewer functional limitations ($p < .001$), and having lower levels of CD ($p = .012$), $R^2 = .212$, $F(9,728) = 21.818$, $p < .001$.

3.2.5. Loneliness—Five variables significantly predicted loneliness severity. Higher levels of loneliness were associated with being single ($p < .001$), as well as having poorer self-rated health ($p = .013$), more functional limitations ($p < .001$), greater visual impairment ($p = .046$), and higher levels of CD ($p < .001$), $R^2 = .114$, $F(9,725) = 10.345$, $p < .001$.

4. Discussion

According to Worrall and Hickson (2003), the impact of communication impairments on older adults' social interactions has received insufficient attention to date. This study is one of the first to examine the impact of CD, regardless of etiology, on a wide range of social relationship characteristics in older adults. Our findings indicated that CD was associated with several different characteristics of the social relationships of older adults, even after controlling for health and demographic variables. Older adults with CD had smaller social networks, experienced fewer positive social exchanges, participated less frequently in social activities, and were lonelier. The strength of the association between the predictors and social outcomes of interest was in the small-to-medium range for social network size, the frequency of positive social exchanges, and the frequency of negative social exchanges, and in the medium-to-strong range for social participation and loneliness (Cohen, 1992).

As expected, demographic, health, and disability characteristics were also significant predictors of social relationship characteristics which is consistent with previous studies of older adults (de Jong-Gierveld & Havens, 2004; Dugan & Kivett, 1994; Grenade & Boldy, 2008; Mugford & Kendig 1987). In general, more positive social outcomes were found for those that were younger, female, married, and in better health. One notable exception was the fact that the presence of more health conditions was associated a larger social network and also more frequent social participation. This finding should be regarded as somewhat tentative, given the fact that the sample was relatively healthy overall with the majority of individuals (80%) reporting three or fewer health conditions. Another possible reason for this finding is that simple lists of health conditions are less accurate measures of the functional health status of older adults than purposely-designed measures (Groll, To, Bombardier, & Wright, 2005) and so it is possible that this is an artifact of the measurement tool. Although this association may appear counterintuitive, however, there are a number of possible reasons that might support this finding as being valid. Older adults with more health conditions may be more likely to seek out, be offered, and accept help resulting in access to a larger number of individuals. This phenomenon, known as the "mobilization of support," explains the association between poorer health and stronger social relationships as has been

described in the literature (Schwarzer & Leppin, 1991). Alternatively, health changes are one of the reasons cited by older adults for relocating to be closer to family members or to a congregate living situation (such as a retirement community) where there is greater access to amenities and other types of support (Choi, 1996; Erickson, Krout, Ewen, & Robison, 2006). Similarly, negative changes in health or a new diagnosis can be the spur to join a support group (Finlayson & Cho, 2011) or to engage in communal health activities (Damush, Perkins, Mikesky, Roberts, & O’Dea, 2005) where there may be a variety of benefits, including increased opportunities for socialization (Gottlieb, 2000).

Findings from the present study demonstrated that CD was a risk factor for smaller social network size and social isolation. Reduced social network size has been documented in older adults with hearing impairments, stroke survivors, and survivors of laryngeal cancer (Blood et al., 1994; Davidson et al., 2008; Weinstein & Ventry, 1982). These studies were not able to isolate the importance of communication, however, as opposed to other physical and functional limitations. The current study provides evidence that CD may be an independent predictor. Such changes have potentially serious implications for older adults’ mental health as older adults with restricted social networks and a paucity of friends have the highest levels of depressive symptoms (Fiori, Antonucci & Cortina, 2006). Companionship is strongly associated with positive mental health, as friends seem to be particularly important for feelings of emotional well-being and self-esteem (Crohan & Antonucci, 1989; Rook, 1987).

Higher levels of loneliness were also predicted by CD. Like social isolation, loneliness is associated with health and well-being, and some authors have argued that its impact has been underestimated (Cohen, 2000; Hawkey & Cacioppo, 2007). Loneliness has been shown to independently predict mortality as well as the likelihood of nursing home admission (Herlitz et al., 1988; Russell, Cutrona, de la Mora, & Wallace, 1997). Descriptive studies provide ample evidence that loneliness is experienced by many adults with communication disorders (Ballin & Balandin, 2007; Parr, 2007; Yorkston et al., 2010). Hearing loss has also been shown to be a significant independent predictor of loneliness (Hawthorne, 2008; Kramer et al., 2002; Strawbridge et al., 2000; Wallhagen et al., 1996). In the current study, not only was CD a significant predictor of loneliness, it also significantly predicted fewer frequent positive social exchanges. This finding suggests a decline in both the quantity and quality of positive social relationships. Reports from friends and family members of individuals with communication impairments report a change in the nature and content of communication, suggesting a decline in the quality of personal relationships which could increase the potential for loneliness (Baylor et al., 2011; Bute, Donovan-Kicken, & Martins, 2007; Heine, Erber, Osborn, Browning, 2002; Héту et al., 1993; Scarinci, Worrall, & Hickson, 2008). Communication partners have reported that conversation becomes more practical and less intimate due to the “work” of communicating. These findings are also consistent with studies of older adults in which the presence of a hearing impairment has been shown to independently predict decreased social support (Pachana, Smith, Watson, McLaughlin, & Dobson, 2008; Schneider et al., 2010).

A surprising finding was the lack of an association between CD and negative social exchanges. Descriptive studies report that individuals with communication impairments

experience a variety of difficulties interacting with friends and family members often resulting in increased interpersonal strain, anger, and frustration (Carter et al., 1998; Héту et al., 1993; Joubert et al., 2011; Scarinci et al., 2008). In the current study, older adults with CD had the same number of negative social exchanges as their normally-communicating peers but a significant decrease in positive social exchanges. According to research on healthy aging, older adults attempt to limit their exposure to relationships that are negative or superficial, as described in Socioemotional Selectivity Theory (SST; Carstensen, Isaacowitz, & Charles, 1999). According to this theory, healthy aging is associated with a gradual decline in social network size over time due to the deliberate abandonment of negative relationships and preservation of positive relationships. Based on the current findings, the social relationship changes that occur for older adults with CD seem to be the opposite of those for healthy older adults. Older adults with CD in the current study seemed to have a stable number of negative interactions and a decline in the number of positive ones, as compared to their normally-communicating peers. These findings differ significantly from those described by SST. The reasons for this are likely multifactorial and require further investigation.

Our findings also revealed a significant association between CD and older adults' participation in social activities. Social participation is highly valued by older adults, and it is also a key rehabilitation outcome for many different kinds of health problems and disabilities (Levasseur, St-Cyr Tribble, & Desrosiers, 2009). In adults with hearing impairments and multiple sclerosis, communication impairments have been shown to significantly predict social participation (Baylor et al., 2010; Marsiske et al., 1997). It appears likely, however, that reduced social participation is related to a reduction in opportunities for positive social exchanges and the loss of some of those social network members with whom these positive exchanges occur. This is consistent with previous research on stroke survivors in which aphasia was associated with the disproportionate loss of friends from the social network (Hilari & Northcott, 2006). As with the findings for social network size, these findings have potentially far-reaching implications for the mental and physical health of older adults with communication impairments.

4.1. Study limitations

The findings from this study must be interpreted with caution for a number of reasons. First, there were very few people in the dataset who had CD that was more than mild. The prevalence of CD in the current study (22%) was lower than that reported by other surveys of older adults. Due to the nature of the study, which involved long, detailed interviews both face-to-face and over the telephone, it is possible that older adults with moderate and severe communication impairments would be less likely to participate and might therefore be under-represented in the final sample. Consequently, these findings may not generalize to older adults with higher levels of communication impairments. A second limitation was that the study data used for this analysis was cross-sectional and so causality cannot be determined. A third limitation is the fact that the presence of CD was based on a combined variable that was novel, measured using a limited number of items, and based on observations by interviewers who were not trained to evaluate the communication status of the participants. As a result, these findings need to be validated and explored in greater detail

with individuals with a documented communication disorder using previously-validated measurement tools. For the reasons listed above, it is possible that the findings in the current study may underestimate the impact of a communication disorder. Additionally, given the low prevalence of older adults with communication disorders in most studies of community-dwelling older adults, it is likely that future surveys may need to deliberately recruit or oversample older adults with more severe impairments in order to identify the impact of a communication disorder that is more than mild.

4.2. Clinical implications and conclusions

Nonetheless, the findings from the current study suggest potentially fruitful avenues for future investigation. Much of the research in this area to date has concentrated on hearing impairment and so it is unclear whether this can be generalized to other types of communication disorders. More recently there has been interest in exploring commonalities across different kinds of disorder (Baylor et al., 2011). It appears that it may be possible to explore the impact of a communication disorder, regardless of etiology, on the lives and social relationships of older adults. Future investigations should use measures of everyday functional communication, such as the Communicative Effectiveness Survey (Donovan, Kendall, Young, & Rosenbek, 2008). There have also been a number of recent publications on the topic of “communicative participation” and how this might be affected by a number of health conditions (Baylor et al., 2010; Baylor et al., 2011). There is now a validated measure for assessing this in the form the Communicative Participation Item Bank (Baylor et al., 2013). While much research has focused on social support exclusively, it appears that other aspects of social relationships should be investigated using measures that have been validated in the fields of sociology and gerontology (Valtorta, Kanaan, Gilbody, & Hanratty, 2016). Further, we did not examine whether communication difficulties affected older men and women equally or whether there were specific gender effects. It would also be worthwhile to investigate whether there are interactions between communication impairments and other types of disability. Research on “dual sensory impairment” has shown that the co-occurrence of visual and hearing impairments can have a more profound impact than either one in isolation (Brennan, Su & Horowitz, 2006; Saunders & Echt, 2007) and similar findings have been reported when hearing impairments and physical impairments co-occur (Kempen, Verbrugge, Merrill, & Ormel, 1998) but it is unclear whether these observations can be generalized to other types of communication disorders and disabilities.

The study findings also have potential clinical implications. The use of the World Health Organization’s (2001) ICF framework has become widespread across the fields of medicine and rehabilitation and encourages clinicians to consider the impact of interventions in a broader perspective (Stucki, Ewert, & Cieza, 2002). This framework has also been applied to the fields of speech pathology and audiology and has the potential to change the way that rehabilitation is provided and assessed (Threats, 2006). In particular, the ICF encourages clinicians to think about the relationship between body function/body structure and activity/participation behaviors, and to provide interventions that promote the best global outcomes. Improved communication alone does not automatically result in improved participation in communicative situations (Simmons-Mackie, 2000). Consequently, the current study

findings provide additional justification for social approaches to intervention for individuals with communication disorders. These approaches focus on considering the individual within his or her social context and the barriers to participation at the societal level with the goal of promoting social participation and increasing quality of life (Worrall & Hickson, 2003). Social approaches to intervention have been advocated for individuals with a wide variety of conditions, including aphasia, hearing impairment, and traumatic brain injury (Carson & Pichora-Fuller, 1997; Jordan & Kaiser, 1996; Simmons-Mackie, 1998; Ylvisaker, Feeney, & Urbanczyk, 1993; Ylvisaker, Turkstra, & Coelho, 2005). Similarly, some authors have advocated for a “life participation approach” to rehabilitation (Chapey et al., 2000).

In conclusion, CD was a significant predictor of several important dimensions of older adults’ social relationships, even after controlling for demographic, health, and disability characteristics. To date, this is one of the few studies to have measured the relative impact of CD (regardless of type) on the social relationships of community-dwelling older adults. These findings are consistent with some of the previous literature which has indicated increased feelings of loneliness and poorer mental health in individuals with communication disorders, reduced levels of social support, higher levels of social isolation, and reduced social participation. The findings from the current study require replication using well-validated communication measures in a diverse sample of older adults. Nonetheless, these findings provide justification for further investigation into the association between communication impairments and a range of social characteristics and also into the impact of intervention on social and communicative participation.

Acknowledgements

Funding for the Later Life Study of Social Exchanges was supported by the National Institute on Aging (AG022957, AG14130). The first author would like to thank the Department of Otolaryngology at Oregon Health Science University for its support while working on this analysis as part of the pilot data for his doctoral dissertation, Dr. Donna Graville for her support, insights, and advice while pursuing this research, and also conference attendees at the annual conventions of the Gerontological Society of America (2012) and the American Speech-Language Hearing Association (2013) for their comments and feedback. The authors would also like to thank the two anonymous reviewers and Dr. Jean Gordon for their recommendations in revising the manuscript.

Appendix A: Social outcome measures

Positive and Negative Social Exchange Items (Newsom et al., 2003)

In the past month, how often did the people you know ...

Positive social exchanges

(Informational support)

1. ...offer helpful advice when you needed to make important decisions?
2. ...make useful suggestions?
3. ...suggest ways that you could deal with problems you were having?

(Instrumental support)

4. ...do favors and other things for you?
5. ...provide you with aid and assistance?
6. ...help you with an important task or something that you could not do on your own?

(Emotional support)

7. ...do or say things that were kind or considerate toward you?
8. ...cheer you up or help you feel better?
9. [In the past month] how often did you discuss personal matters or concerns with someone you know?

(Companionship)

10. ...provide you with good company and companionship?
11. ...include you in things they were doing?
12. ...do social or recreational activities with you?

Negative social exchanges

(Unwanted advice or intrusion)

13. ...give you unwanted advice?
14. ...question or doubt your decisions?
15. ...interfere or meddle in your personal matters?

(Failure to provide help)

16. ...let you down when you needed help?
17. ...ask you for too much help?
18. ...fail to give you assistance that you were counting on?

(Rejection or neglect)

19. ...leave you out of activities you would have enjoyed?
20. ...forget or ignore you?
21. ...fail to spend enough time with you?

(Unsympathetic or insensitive behavior)

22. ...do things that were thoughtless or inconsiderate?
23. ...act angry or upset with you?
24. ...act unsympathetic or critical about your personal concerns?

Social Disengagement Index (Bassuk et al., 1999)

In the past month, how often did you...

1. ...attend meetings of clubs, or community or professional organizations?
2. ...get together or talk on the phone with family members?
3. ...get together or talk on the phone with friends?
4. ...work on a hobby?
5. ...play cards, bingo, or similar games?
6. ...go out to movie, restaurant or sporting event?
7. ...go out and do some shopping?
8. ...day trips, overnight trips?
9. ...do volunteer work?

UCLA Loneliness Scale-Abbreviated (Russell, 1996)

How often do you feel...

1. ...isolated from others?
2. ...that you belong to a group of friends?
3. ...that no one really knows you well?
4. ...that your relationships with others are not meaningful?

5. ...that there are people who really understand you?
 6. ...that you lack companionship?
-

Appendix B: Continuing education questions

1. In the current study, the prevalence of communication difficulty was:
 - a. 1%
 - b. 14%
 - c. 22%
 - d. 55%
2. In a binary comparison, individuals with communication difficulty differed significantly on all of the following with the exception of:
 - a. Age
 - b. Gender
 - c. Self-rated health
 - d. Functional limitations
3. In a series of multiple regressions, after controlling for health and demographic characteristics, communication difficulty was a significant predictor of:
 - a. Loneliness, the number of positive social exchanges, social network size and social participation
 - b. Loneliness, the number of negative social exchanges, social network size and social participation
 - c. Loneliness and social participation
 - d. Social network size
4. Previous research has found that loneliness:
 - a. Is indistinguishable from depression.
 - b. Is indistinguishable from social isolation.
 - c. Is an independent risk factor for depression, mortality, and nursing home admission.
 - d. Is always significantly associated with hearing impairment.
5. According to Socioemotional Selectivity Theory, changes in perspective due to advancing age result in older adults prioritizing:
 - a. Novel relationships over those which are familiar

- b. Close, rewarding relationships over those which are negative or superficial
- c. Relationships with family over friends
- d. Relationships with friends over family

Answers: 1c, 2b, 3a, 4c, 5b.

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Highlights

- Communication difficulty (CD) was associated with altered social relationships.
- CD predicted social isolation, less social participation, & greater loneliness.
- CD may affect positive more than negative aspects of social relationships.
- Older adults with CD may be at higher risk for mental & physical health problems.

Learning outcomes

As a result of this activity, the following learning outcomes will be realized: Readers will be able to (1) describe changes in the social relationships of older adults that occur as part of normal aging, (2) identify the aspects of social relationships that were significantly impacted by a communication difficulty, and (3) discuss possible reasons for these findings including potential clinical implications.

Table 1

Means and standard deviations for all study variables in all study participants and comparing those with and without communication difficulty.

Variable	All participants (n = 742)	Differences based on presence versus absence of CD		P
		No CD (n = 576)	CD (n = 166)	
<u>Demographic, health, and disability characteristics:</u>				
Age	74.91 (± 6.52)	74.15 (± 6.23)	77.53 (± 6.84)	< .001
Female	0.62 (± 0.49)	0.63 (± 0.48)	0.56 (± 0.50)	.103
Single (divorced, separated, or never married)	0.13 (± 0.33)	0.12 (± 0.33)	0.14 (± 0.35)	.598
Widowed	0.34 (± 0.47)	0.33 (± 0.47)	0.39 (± 0.49)	.164
Self-rated health	2.07 (± 1.07)	2.23 (± 1.04)	1.54 (± 1.03)	< .001
No. of health conditions	2.23 (± 1.61)	2.07 (± 1.58)	2.75 (± 1.63)	< .001
Functional limitations ^a	0.63 (± 0.64)	0.50 (± 0.55)	1.08 (± 0.72)	< .001
Visual impairment	0.13 (± 0.41)	0.06 (± 0.23)	0.26 (± 0.44)	< .001
Communication difficulty	0.11 (± 0.26)	0.00 (± 0.00)	0.54 (± 0.38)	< .001
<u>Social characteristics:</u>				
Social network size	5.94 (± 3.29)	6.14 (± 3.37)	5.17 (± 2.83)	.004
Freq. of positive social exchanges	2.43 (± 0.80)	2.47 (± 0.78)	2.30 (± 0.87)	.036
Freq. of negative social exchanges	0.43 (± 0.56)	0.40 (± 0.54)	0.52 (± 0.64)	.016
Freq. of social participation	1.94 (± 0.74)	2.03 (± 0.70)	1.63 (± 0.77)	< .001
Loneliness	5.08 (± 3.54)	4.69 (± 3.38)	6.45 (± 3.74)	< .001

CD = Communication difficulty.

^aThe average difficulty on a 0-3 scale across 14 ADL and IADL items, excluding phone use.

Table 2

Correlations among communication-related items.

	1	2	3	4
1. Difficulty with telephone use (SR)	-	.203**	.378**	.721**
2. Difficulty responding to questions (IR) <i>b</i>		-	.326**	.733**
3. Difficulty hearing (IR)			-	.729**
4. Communication difficulty score				-

IR = Interviewer reported.

SR = Self-reported.

b This item was reverse-coded so that higher scores indicated greater difficulty, consistent with the other items.**
p < .001.

Table 3

Correlations between communication-related items and social characteristics.

	Social network size	Freq. of PSE	Freq. of NSE	Freq. of social participation	Loneliness
1. Difficulty with telephone use (SR)	-.066	-.083*	.006	-.173**	.135**
2. Difficulty responding to questions (IR) ^c	-.110**	-.092*	.131**	-.203**	.203**
3. Difficulty hearing (IR)	-.071	-.057	-.008	-.151**	.098**
4. Communication difficulty score	-.117**	-.104**	.067	-.244**	.204**

IR = Interviewer reported.

NSE = Negative social exchanges.

PSE = Positive social exchanges.

SR = Self-reported.

^cThis item was reverse-coded so that higher scores indicated greater difficulty, consistent with the other items.* $p < .05$;** $p < .001$.

Table 4

Correlations among social relationship measures.

	1	2	3	4	5
1. Social network size	-	.293**	.155**	.345**	-.161**
2. Freq. of PSE		-	.007	.219**	-.304**
3. Freq. of NSE			-	-.007	.323**
4. Freq. of social participation				-	-.341**
5. Loneliness					-

NSE = Negative social exchanges.

PSE = Positive social exchanges.

**
 $p < .001$.

Table 5

Correlations between demographic, health, and disability characteristics and social outcomes.

	Social network size	Freq. of PSE	Freq. of NSE	Freq. of social participation	Loneliness
Age	-.183**	-.082*	-.151**	-.137**	.051
Gender	-.001	.112**	.024	.161**	-.001
Single	-.028	-.018	.119**	-.008	.121**
Widowed	-.120**	.072	-.055	-.017	.024
Self-rated health	.060	-.007	-.109**	.317**	-.231**
No. of health conditions	.059	.057	.093*	-.091*	.135**
Functional limitations	-.065	.051	.157**	-.353**	.264**
Visual impairment	-.068	-.006	.064	-.184**	.036
Communication difficulty	-.117**	-.104**	.067	-.244**	.204**

NSE = Negative social exchanges.

PSE = Positive social exchanges.

* $p < .05$;** $p < .001$.

Table 6

Results of multiple regressions for social relationship outcomes.

Predictor	Dependent variables														
	Social network size			Freq. of PSE			Freq. of NSE			Freq. of social participation			Loneliness		
	B	SE	β	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Age	-.073	.023	-.143**	-.014	.005	-.114**	-.020	.004	-.232***	-.001	.004	-.010	-.017	.021	-.031
Gender	.155	.307	.022	.142	.066	.086*	.021	.046	.018	.295	.054	.194***	-.170	.277	-.023
Single	-.804	.423	-.082	-.059	.093	-.025	.161	.065	.094*	-.041	.077	-.019	1.352	.391	.128**
Widowed	-.709	.328	-.103*	.105	.073	.062	.012	.050	.010	-.022	.060	-.014	.378	.306	.051
Self-rated health	.227	.158	.073	.021	.035	.028	-.003	.024	-.005	.123	.028	.179***	-.363	.145	-.110*
No. of health conditions	.230	.094	.114*	.030	.021	.060	.004	.014	.012	.063	.017	.138***	-.016	.088	-.007
Functional limitations	.085	.274	.017	.110	.061	.088	.158	.042	.179***	-.329	.050	-.287***	.972	.255	.175***
Visual impairment	-.009	.353	-.001	.052	.079	.027	.080	.054	.058	-.094	.065	-.052	-.666	.332	-.077*
Communication difficulty	-1.191	.593	-.091*	-.368	.129	-.117**	.113	.091	.049	-.264	.105	-.092*	2.121	.536	.154***
R ²	.062			.046			.085			.212			.114		

SN = Social network.

PSE = Positive social exchanges.

NSE = Negative social exchanges.

* $p < .05$;

** $p < .01$;

*** $p < .001$.