

ELENA PIRANI*

Self-rated health among disabled persons: the multifaceted relevance of social integration

1. INTRODUCTION

Correlations between social integration and health or health-related quality of life outcomes have been found in a range of contexts and using a variety of methods and indicators (Seeman, 1996; Berkman *et al.*, 2000; Kumar *et al.*, 2012). Although social networks, social support and social participation were generally indicated as relevant factors for maintaining good health and well-being at all ages and in all life cycle's stages (Morgan *et al.*, 1984), empirical literature proved that they bring substantial benefits especially to certain groups of people. For instance, various scholars confirmed the crucial role of embeddedness in social relationships and community life in increasing self-rated health (Nummela *et al.*, 2008; Cornwell and Waite, 2009; Caetano *et al.*, 2013; Youm *et al.*, 2014) and health-related well-being (Schwarzer and Leppin, 1989; Hawton *et al.*, 2011) among elderly, or people with high risk of isolation and impairment. A number of studies showed a survival advantage (Glass *et al.*, 1999; Musick, 1999) and reduced levels of depressive symptoms (Heikkinen and Kauppinen, 2004) for older adults participating in social or productive activities or being socially active. Social engagement and expansive social connections proved also protecting effects against the onset of dementia (Fratiglioni *et al.*, 2000; Wang *et al.*, 2002) and cognitive decline in middle-later life (Bassuk *et al.*, 1999; Singh-Manoux *et al.*, 2003). The positive relationship was proved from low- to middle and high-income countries (Sirven and Debrand, 2008; Kumar *et al.*, 2012).

In a similar way, social connections and embeddedness in social life are conceivable to influence the ability to fully enjoy living in the community among disabled people and thus their well-being. Physical and/or mental disability may restrict the chances of social life; persons with limited mobility are likely to report feelings of isolation or loss of independence (Cornwell and Waite, 2009; Hawton *et al.*, 2011; Holanda *et al.*, 2013). Moreover, persons affected by disability require regular assistance on daily tasks and are more exposed to psychological or physical problems associated with their impairment. Therefore, whereas the formation of social networks is of fundamental importance in the quality of life and well-being of all individuals, disabled people may still benefit from social relationships perhaps more

* Department of Statistics, Computer Science, Applications "G. Parenti", University of Florence, University of Florence, Italy; e-mail: pirani@disia.unifi.it.

so. For example, a high level of social integration could help overcoming constraints of mobility – similarly to what happens for aging populations (Kang and Michael, 2013) – reducing feelings of loneliness, and enhancing sense of mastery or control over life experiences (Morgan *et al.*, 1984; Cott *et al.*, 1999). Nevertheless, very little work (Morgan *et al.*, 1984; Holanda *et al.*, 2013; Emerson *et al.*, 2014) has been directed to the characteristics and the degree of the involvement in social activities and their links with health among disabled persons.

In this study, we concentrated on the link between self-rated health and social integration among Italian disabled persons. To the best of our knowledge, empirical studies on this issue are lacking for Italy. This country counts about 4 million persons affected by some kinds of disability (Istat, 2009, 2012), representing a non-negligible share of the population that requires governmental and civil society support to ensure their social inclusion. Italy is worldwide recognized as a country of strong ties, solidarity, and parental connections. However, we do not know anything as for the association between self-rated health of disabled persons and their social integration in a wider social and community life.

Because of the exploratory nature of this study we did not generate specific hypotheses. We had nonetheless a twofold aim. First, after the identification of the main social integration domains in which Italian disabled men and women are embedded in, we investigated whether these domains are associated with self-rated health status and their relative importance. Second, we verified if the possible association with self-rated health changes according to individual socio-demographic characteristics. Due to the cross-sectional nature of data, we did not attempt to infer causal mechanisms. Nevertheless, a better understanding of the link between self-rated health and social integration could offer useful insights for the development of interventions to improve social inclusion (Istat, 2009; World Health Organization, 2011) and health of people with disability, and reduce their need for formal health care.

2. SOCIAL INTEGRATION AND HEALTH: AN OVERVIEW

Social integration is conceived as active engagement in social ties, institutional connections or community activities (Seeman, 1996; Bassuk *et al.*, 1999; Berkman *et al.*, 2000). Social integration thus refers to embeddedness in a large variety of social connections and relationships spanning the range from the most intimate to the most extended ones.

In the following paragraphs, we will review the main types of relationships and connections that enhance social integration of individuals, namely social network and social support (par. 2.1) and social engagement (par. 2.2) scrutinizing their relevance for individual health; then, we will discuss the mul-

tidimensional nature of individuals' social relationships (par. 2.3). Finally, we will consider some issues about the relevance of inclusion in social life for the health of disabled people (par. 2.4).

2.1 *Social networks and social support*

Primary sources of social integration are the relationships of individuals with their more intimate and strict environment: family, relatives, and confidants (Morgan *et al.*, 1984; Kang and Michael, 2013). Besides, also more distant and formal contacts, like friends, neighbors, colleagues and, more generally, social acquaintances (Seeman, 1996; Litwin and Stoeckel, 2013) determine connectedness of people. This complex web of contacts and relationships that surround individuals represents their so-called *social networks* (Berkman *et al.*, 2000). Embeddedness in social networks can positively influence health acting on a behavioral perspective. By triggering mechanisms of social influence (Marsden and Friedkin, 1994), the involvement in wide and strong social ties may increase the likelihood to adopt health-promoting behaviors and to refrain from health damaging ones (Melchior *et al.*, 2003) or facilitate access to and use of medical care (Stansfeld, 2006; Caetano *et al.*, 2013).

Social networks enable individuals to feel socially included (Seeman, 1996), but they are relevant in well-being discourse not only per se: They represent the structures providing *social support* (Morgan *et al.*, 1984; Seeman, 1996; Caetano *et al.*, 2013). The existence of a solid network of connections enhances the chances to receive emotional support – e.g., expression of positive affect, understanding and feeling to be loved and valued – as well as material aid, informational exchange, advice or guidance. These factors are linked to good health and health-related well-being through psychological mechanisms (Berkman *et al.*, 2000; Melchior *et al.*, 2003). Even potential social support, or the impression to have someone to count on and trust in case of need, can represent a form of assistance able to enhance well-being because linked to the belief that one is cared for and belongs to a network of mutual obligation (Caetano *et al.*, 2013).

Previous studies proved effectiveness of social support in slowing the cognitive decline of elderly, and in advancing individuals' psychological and physical health (Schwarzer and Leppin, 1989; Cornwell and Waite, 2009; Hawton *et al.*, 2011 Kumar *et al.*, 2012;), as well as in improving medical and non-medical care, particularly in advantage to those experiencing health problems (Berkman, 1984; Locker, 2008).

The link between health and social networks or social support can be shaped through pathological mechanisms, too (Berkman *et al.*, 2000). Scholars argued that social isolation could act as a chronic stressor, resulting in the accelerated aging of human organism (e.g., Berkman, 1988). On the contrary,

extended social ties, and especially emotional support (Seeman, 1996), may act as a protector of the neuroendocrine and cardiovascular systems (e.g., Seeman and McEwen, 1996) thus improving the immune function and reducing the body's susceptibility to illness (for a review see Seeman, 1996).

2.2 *Social engagement*

Social networks with one's intimate and/or extended milieu do not complete the range of possible relationships of individuals, however. *Social engagement*, or social participation, refers to the individual's attitude to take part in formal or informal groups (Bassuk *et al.*, 1999; Putnam, 2000). Such activities can involve various aspects of life and take many forms, for instance paid employment, involvement in church activities, participation in different kinds of associations – voluntary or charity groups, cultural or sport clubs – attendance of exhibitions or events, or involvement in leisure or educational activities (Kang and Michael, 2013).

Psychological pathways may delineate the link between social engagement and health-related well-being (Berkman *et al.*, 2000). Participation in social activities can foster trust, self-esteem, identity (Bassuk *et al.*, 1999; Caetano *et al.*, 2013) and perception of control (Cattel, 2001). Bassuk and colleagues (1999) argued that a life engaged person has probably a higher sense of purpose and fulfillment, and is more prone to participate in complex interpersonal exchanges. Participation in society and community activities fulfills a twofold function: from the one side it provides opportunities for companionship and sociability; from the other side, it contributes to develop a sense of identity and purposefulness. All these positive feelings and attitudes are well-known linked to better health conditions (Berkman *et al.*, 2000).

Several studies showed that higher levels of self-rated health and healthier physical and mental health outcomes are associated with social participation and engagement (see Nummela *et al.*, 2008 for a review of major findings). Results are rather consistent across countries and also on a longitudinal perspective. In particular, the participation in group activities proved to sustain a successful aging by increasing happiness and functioning (Menec, 2003) and to reduce the likelihood to report poor self-rated health in older adults (Caetano *et al.*, 2013).

2.3 *The multidimensional nature of social integration*

Generally speaking, all forms of interpersonal relationships provide chances to feel part of a community. Nevertheless, each form of connection serves a different emotional or material function, thus they usually are not alternative one to the others – rather they should be considered complementary. The lack

of social relationships diversity could threaten health as much as the absence of relationships (Morgan *et al.*, 1984; Cornwell and Waite, 2009). In line with this perspective, although the quantity of social relationships is crucial in enhancing individuals' health and well-being, also their quality does matter (Seeman, 1996).

Irrespective of their size, different network types (e.g., family, friends, community) convey different meanings for health and well-being (Litwin and Stoeckel, 2013). Social engagement, as well as providing opportunities of friendship, sociability, and cooperation, defines and reinforces meaningful social roles - e.g., parental, occupational, community - enhancing a health-promoting sense of identity, purpose and fulfillment (Bassuk *et al.*, 1999). Intimate social ties with family and confidants are probably irreplaceable in providing a sense to be valued and loved, or emotional support (Berkman *et al.*, 2000). Instrumental or informational support, reassuring individuals that they are cared about (Morgan *et al.*, 1984), can probably be afforded also by weak ties with a scarce degree of intimacy. In many cases, of course, these functions and their influences on individuals overlap. Moreover, support, social activities or associational groups were found to have different importance and implications for different persons by gender or by age (Morgan *et al.*, 1984; Nummela *et al.*, 2008).

With these considerations in mind, it is straightforward that social integration is a multifaceted and compound construct and, as such, it should be analyzed (Nummela *et al.*, 2008). Various scholars insisted on the need to explore the multi-dimensional construct of social integration, and its links with health, recurring to multiple indicators reflecting each dimension (Cutrona and Russel, 1987; Fiori *et al.*, 2007). In this sense Fiori *et al.* (2007) suggested to conceptualize social relationships considering in concert the structure, the function and the quality of individuals' social groups. Some researchers introduced in their analysis a generic indicator of social relationships measured through the occurrence (yes/no) of face-to-face visits, phone calls or emails with relatives and friends (e.g., Bassuk *et al.*, 1999; Caetano *et al.*, 2013; Mithen *et al.*, 2015), while Emerson and colleagues (2014) directly accounted for the network size. Morgan *et al.* (1984) and Deindl *et al.* (2015), after considering the number of network partners, also evaluated the network type depending on the prevalence of kin or friends. Litwin and Stoeckel (2013) discussed the role of the different types of networks surrounding individuals (distinguishing among diverse, family-focused, friend-focused, and restricted networks).

The various indicators of social support used in previous studies are generally comparable: for instance, they refer to the presence of a confiding relationship in situations of financial or emotional trouble (Morgan *et al.*, 1984), to the presence of persons who can count on or whom can ask for help (Caetano *et al.*, 2013), or to the presence of persons who could ask for small favors or to confide in (Mithen *et al.*, 2015). The received help, and not the potentially available support, was instead considered by Deindl and colleagues (2015).

In contrast, no consensus across different studies and surveys on the spectrum of social activities, and above all on those mostly linked to benefits for health, does exist. Whereas someone considered a generic participation in groups, organizations and activities outside home (e.g., Morgan *et al.*, 1984; Mithen *et al.*, 2015), other scholars could count on data identifying specific types of activities, namely attending theatre, cinema, and exhibitions, participation in sport clubs, travelling, voluntary work, involvement in religious events, and engagement in studying and self-development activities (Wang *et al.*, 2002; Nummela *et al.*, 2008; Kang and Michael, 2013; Emerson *et al.*, 2014).

2.4 *Social integration of disabled persons*

Most of previous research has been devoted to the role of socio-economic factors on the health of disabled people (Cott *et al.*, 1999; Emerson *et al.*, 2011), neglecting their social integration. Only a few studies have, so far, focused on exploring the characteristics of social networks and social participation of disabled persons, or their association with self-rated health.

Disabled individuals are generally characterized by low levels of community integration, especially as for social engagement. Social networks of disabled people, although not limited in size, typically are structurally homogeneous and formed by their (nuclear) family or a limited circle of contacts and confidants; in contrast, participation to social groups or community activities and development of a large net of relationships is rather rare across disabled persons (Morgan *et al.*, 1984; Holanda *et al.*, 2013). Although the close confiding relationships are fundamental in providing emotional and appraisal support (Berkman *et al.*, 2000), they are not sufficient to serve functions like self-efficacy, autonomy, or perception of control, mostly linked to individual's social engagement (Bassuk *et al.*, 1999; Caetano *et al.*, 2013). Recently, Emerson and colleagues (2014), considering contemporary population-based sampling frames, highlighted the importance of both contacts with friends and social and civic participation for the health of adults with intellectual disabilities. The characteristics of the relationships of disabled people could trigger an escalation of social isolation which may potentially exacerbate negative moods linked to the disability status.

Moreover, it is worthwhile mentioning that the study of the link between social integration and health is challenged by the existence of a strong selection effect: people in poor health may be unable to be active and maintain social contacts or social participation, whereas those in better health are able to participate more frequently in different kinds of activities and enlarge their networks. This issue can be even more relevant for disabled people, who could be blocked in their possibilities of communication or movement. Nonetheless, longitudinal studies addressing causal mechanisms (e.g., Bennett, 2005; Giordano *et al.*,

2012; Sirven and Debrand, 2012) proved the persistence of a positive relationship between different elements of social integration and health.

All in all, empirical evidence on the link between self-rated health and social integration for disabled persons is sparse, and especially absent for Italy. Nevertheless, considering, on the one side, the link proved for the general population between health and social integration and, on the other side, the difficulties faced by disabled persons in everyday life and their higher vulnerability to poor health, we aim at putting attention on the need for healthy inequalities research to address this issue for this segment of population.

3. METHOD

3.1 *Study sample and research methods*

Data for the empirical analyses were based on the Italian survey “Social inclusion of people with functional limitations” carried out in 2011 by the Italian Institute of Statistics (Istat). Data were collected on those individuals who, during the national survey on “Health Conditions” carried out in 2004-2005, were aged 6-80 years old and declared to be affected by different levels of functional limitations, namely physical impairments, impairment in sensory and speech, and difficulty in carrying out daily life essential activities (Istat, 2012). Overall, the sample referred to a population of nearly 4 million Italian persons for whom the disability status onset at least 7 years before (i.e., they were disabled in 2004-2005). The survey did not contemplate institutionalized disabled persons; this should not lead to an underestimation of the phenomenon, however, because institutionalized disabled represents less than the 5% of the whole collective (Istat, 2009).

The total sample size of the Istat survey amounted to 3,121 individuals. However, we excluded from our analytical sub-sample individuals aged less than 18 (0.7% of the sample), and individuals for whom information collected in the survey were not complete (20.8%). We also excluded from our analysis observations referring to individuals who did not answered directly to the questions (28%), whichever the reason (for instance, due to particular situations of illness, or because they were not present in the household during the whole time span of the survey). Indeed, a proxy respondent could not be able to capture the subjective dimensions, both for health and social relationships to which we refer to. Moreover, persons who are not able to respond directly could be affected by particular impairments making them a highly selected group. Finally, our total sample size amounted to 1,463 individuals, 513 men and 950 women. This selection slightly reduced the presence of higher impaired individuals in our analytical sample, and led to a minor overrepresentation of the oldest old disabled (Table 1).

Empirical analyses proceeded as follow. First, in order to assess the

domains of social integration of Italian disabled people, we performed a factor analysis. Second, the resulting domains (the factors scores) were inserted in a logistic regression model as key explanatory variables of the self-rated health. This statistical model allowed us to assess the association between domains of social integration and self-rated health, controlling for a set of potential socio-demographic confounders. It is straightforward that the cross-sectional nature of the data imposed to look at associations, simply estimating whether different levels of social involvement were associated with bad health, without presumption to assess causal mechanisms. Nevertheless, by controlling for a wide set of individual characteristics, we could at least account for a part of heterogeneity across individuals (Gini, 1914). As third step, we tested the significance of the interactions terms between individual socio-demographic covariates and social integration domains to verify if the found associations depended on individual characteristics. In other words, we estimated 8 additional models, each of them including the interaction terms between the social integration domains and the individual covariates one by one. All the statistical analyses were performed using the software Stata.

3.2 *Integration's indicators: factor analysis*

Although social integration is a multidimensional construct that cannot be assessed in full by a single indicator alone, the simultaneous use of several indicators of social relationships has been rare (Nummela *et al.*, 2008). We performed a factor analysis to determine a synthetic measure of the different relationships in which disabled individuals are embedded in.

Factor analysis is a commonly used technique to reduce complexity of a large set of variables to a smaller set of “common factors” facilitating the interpretation of the object under investigation (Kim and Mueller, 1978), social integration in our case. These factors can then be used as substitute of the original independent variables, every factor being independent from the others. Variables describing quality and quantity of relationships available in our data are dichotomous or categorical, so violating the assumptions needed for standard methods, i.e. that the variables are continuous and follow a multivariate normal distribution. This problem can be overcome by performing an exploratory factor analysis that relies on a polychoric correlation matrix as input, rather than on raw variables. When using polychoric estimators, the researcher assumes that the dichotomous measured variables are imperfect measures of underlying latent continuous variables (Kline, 2011).

To obtain information of the social and relational activities during the past 12 months, we considered 13 variables describing the involvement of individuals in different types of relationships (see Table A1 in the Appendix for the exact wording of questions and response categories). First, we used the frequency of meeting with *i*) family and *ii*) friends. In particular, for each

category we used an indicator of actual frequency (1 = less than monthly; 2 = monthly), and an indicator of satisfaction about of this frequency (1 = less frequently than desired; 2 = as than desired). Second, we considered the availability of help that a person can count on from *i*) family, *ii*) friends and *iii*) neighbors. Each indicator was dichotomized (1 = no; 2 = yes). Such indicators convey the individual perception of the availability of social support, and are considered more important than received support, which is confounded with need (Gilmour, 2012). In order to measure engagement in public and community activities, we added the participation in associations (1 = no; 2 = yes), and the frequency of going out (1 = less than weekly; 2 = at least one time per week; 3 = daily). The attendance of *i*) museums and exhibitions and *ii*) cinemas, theatres, opera or concerts was investigated asking individuals if they are not interested in such activity (1), they do not perform it (2), they perform it less than desired (3), or as frequently as desired (4). Finally, we introduced into the analysis the declared involvement in trips (1 = no; 2 = yes) and in reading activities (1 = no; 2 = less than 5 book in the last year; 3 = 5 or more books in the last year).

The great majority of disabled persons can count on relatives' help in case of need (see again Table A1 in the Appendix) and, although most of them does not see often non-cohabitant relatives (i.e., monthly), they declared to meet them as frequently as desired. Respondents are satisfied also about the frequency of meetings with friends. About half of our sample goes out daily, but a very little proportion declares to participate in associations, make holiday trips, and go to cinemas, theatres or museums.

3.3 Health indicator

The outcome variable of logistic regression analysis was the self-rated health, a powerful predictor of morbidity, use of physician services, and mortality across different samples and multiple countries (Idler and Benyamini, 1997; Miilunpalo *et al.*, 1997). It was measured according to the question suggested by the World Health Organization "How is your health in general?". From this item a dichotomous outcome variable (0 = very good, good or fair; 1 = poor or very poor) was formulated for the purposes of the analysis.

Self-rated health is based on the respondents' sense of psychological well-being as well as their physical health. Although research on the correlates of self-rated health are less well understood in persons with disability or chronic conditions (Drum *et al.*, 2008), this indicator provides an assessment that goes beyond a simple summing of medical conditions or the level of disability engendered by those conditions (Cott *et al.*, 1999). Even if not perfectly correlated with objective health, it allows for a global, complete, and reliable evaluation of individual health status and general well-being.

Among the 1,463 men and women included in our analysis, the self-assessment of health status is concentrated on the halfway modality, namely

“fair health” (52.8% of the analytical sub-sample). The proportion of people assessing their health as good is limited: 11.3% of the sample reported good health, and only 1.1% very good health. A little more than a third of the analytical sample reported being in bad health (30.9% declared bad health, and 3.9% very bad health) and this proportion increases to 53% across people with a more serious level of disability. This percentage is higher relative to the total population, where the proportion of bad health is generally around 10% (Istat, 2015). These findings were somewhat predictable, at least from a descriptive point of view, because of the focus on a sample of individuals with health impairments (Drum *et al.*, 2008). Nevertheless, although physical impairments and chronic diseases are important for the establishment of subjective health, persons with functional disabilities can also report a good health status (Cott *et al.*, 1999; Drum *et al.*, 2008).

3.4 *Individual socio-demographic characteristics*

In the logistic regression analysis we accounted for additional socio-demographic characteristics relevant for health. The selection of these variables was informed by findings of prior studies on predictors of self-rated health (e.g., Cott *et al.*, 1999; Emerson *et al.*, 2011) and constrained by data availability. Table 1 shows the distribution of the sample according to the individual socio-demographic characteristics and the self-rated health status.

First, in order to account for the diverse level of disability, we considered a dichotomous indicator describing the seriousness of the impairment (1 = low; 2 = high). For 62% of our sample it was about a serious impairment. Second, we distinguished the respondents according to the type of disability, a factor that could matter for their social life: 1) disability in communication (sight, hearing or speech problems); 2) disability in movement (e.g., difficulty in walking or in climbing several flights of stairs, or other conditions that restrict physical activity); 3) functional disability (if the person is not able to autonomously take care of him/herself, e.g., as for bathing or dressing).

In addition, for control purposes, gender (1 = male; 2 = female) and age groups (1 = 18-44; 2 = 45-64; 3 = 65-74; 4 = 75 and higher) were also included. Then, we introduced as covariates the area of residence (1 = North; 2 = Centre; 3 = South and Islands) and the living arrangement of individuals grouped into living solo (1), living in couple with or without child(ren) (2), living in other forms of arrangement (3), namely with relative and/or other persons. We acknowledge that the fact that a person lives solo and independently is strongly associated with his/her functional capability. Finally, the socio-economic status of individuals was accounted for through the highest level of education achieved (1 = high; 2 = medium; 3 = low) and the self-perceived adequacy of financial resources (1 = very good and good; 2 = poor and very poor).

Table 1 – *Descriptive statistics on variables used in the analysis, by self-rated health, Italy, 2011, percent, analytical sub-sample and total sample*

	Good health (very good, good, fair) N = 953	Bad health (bad, and very bad) N = 510	Total sub- sample N = 1,463	Total sample N = 3,121
<i>Level of disability</i>				
Low	72.7	42.2	62.1	44.4
High	27.3	57.8	37.9	55.6
<i>Type of disability</i>				
Communication	49.1	53.3	50.6	58.4
Movement	35.8	38.0	36.6	32.6
Functional	15.1	8.6	12.9	9.1
<i>Gender</i>				
Male	40.8	24.3	35.1	37.0
Female	59.2	75.7	64.9	63.0
<i>Classes of age</i>				
18-44	4.7	1.6	3.6	5.2
45-64	19.8	18.4	19.3	14.9
65-74	28.4	32.3	29.8	24.1
≥75	47.1	47.7	47.3	55.8
<i>Living arrangement</i>				
Living solo	28.7	29.6	29.0	27.0
In couple with/without child(ren)	45.8	44.9	45.5	53.7
Other forms	25.6	25.5	25.6	19.3
<i>Area of residence</i>				
North	36.4	33.7	35.5	34.0
Center	20.9	19.8	20.5	19.2
South and islands	42.7	46.5	44.0	46.8
<i>Educational level</i>				
High	19.2	16.1	18.1	14.5
Medium	21.1	17.1	19.7	17.6
Low	59.7	66.9	62.2	67.9
<i>Financial resources</i>				
Good	61.0	43.7	55.0	53.6
Not good	39.0	56.3	45.0	46.4

Source: our elaborations on data from the Italian survey Social inclusion of people with functional limitations, Istat, 2011.

4. RESULTS

The procedure of factor analysis¹ univocally identified 5 common factors which, relying to the raw original variables, were easily labelled (Table A2 in the Appendix). As expected, we identified domains social integration, each of them pointing at different functions served by the different types of rela-

¹ We used factor analysis of the polychoric correlation matrix and then performed a orthogonal rotation of the loading matrix through varimax criterion.

tionships, from emotional sustenance afforded by contacts with relatives and friends to tangible assistance guaranteed by them, to self-esteem and identity enhanced by engagement in social and community activities.

The first identified factor refers to the propensity of individuals to participate in associations, to go out, to attend cinemas, theatres and museums, to regularly read books and make trips. In brief, this domain refers to the community participation and “*social engagement*” of individuals. The second and the third factors have been labeled “*friendships*” and “*family*” *ties*, because of their correlation with the indicators of contacts with friends and relatives, respectively. These two domains are somewhat overlapping, but clearly evidence the propensity to meet a given category of peers and to be satisfied with the frequency of these contacts. The fourth factor is significantly correlated with only two variables, partly overlapping the *social engagement* domain, but it appears nonetheless relevant in our context. It refers in particular to the attendance of cinema, theatre, and museum, so we labeled it “*leisure activities*” domain. Finally, the fifth domain refers to the perceived availability of support from different peer groups, a potential “*social support*” that individuals feel available in case of need.

4.2 *Integration domains and health perception*

In order to investigate if and to what extent the different integration domains are associated with self-rated health status – our first aim – we estimated a logistic regression model for the probability of bad self-rated health, where the keys independent variables were the individuals’ scores in each domain of social integration identified through the factor analysis. Because of differences in the range of variability of the factor scores, they have been re-scaled within the range 0-100. Table 2 present model results in form both of coefficients and of Average Marginal Effects² (AMEs).

The domain of *social engagement*, which resumes participation in associations, going out and performing different social activities (the ones available in our data), resulted to be a relevant domain of social integration linked to health. In particular, one point more in the score of the *social engagement* domain is associated to a reduction of about 10 percentage points in the probability to perceive poor or very poor health (AME = -0.098). In contrast, the

² The Average Marginal Effect (AME) expresses the effect on $P(Y=1)$ as an explanatory categorical covariate x_i changes from one category to another or as a continuous variable increases of one unit, averaged across the values of the other covariates introduced in the model. The AME of each covariate thus represents the percentage points change in the predicted probability of perceiving bad health for the different characteristics time by time considered, averaged across the values of other covariates, i.e. population-averaged. This is suggested as a useful method to compare groups of individuals or results from different models (Mood, 2010).

social networks, understood as the set of contacts with family and friends and synthesized in our analysis with the *friendship* and *family ties* domains are not significant in determining differences in self-rated health, although high in magnitude (AME equal to -0.165 and -0.137 respectively), other things being equal. The perceived availability of help and *social support* represents instead a critical factor in reducing the probability of bad health (AME = -0.180, or 18,0 percentage points). In other words, rather than meeting friends, relatives and neighbors, it is important the perception to can count on them and on their help in case of need. Finally, Table 2 illustrates that also the so-called *leisure activities* domain is significant in decreasing the probability of bad self-rated health, even if with a lower magnitude with respect to the other domains (AME = -0.027, or 2.7 percentage points).

Table 2 – Results from the logistic regression model predicting probability of being in bad health: estimated coefficients and Average Marginal Effects (AMEs), Italy, 2011 (N = 1,463)

	B	se B	p-val.	AME	se AME	p- val.
High level of disability (ref.: low)	1.124	0.128	0.000	0.234	0.027	0.000
<i>Type of disability (ref.: communication)</i>						
Movement	-0.108	0.131	0.408	-0.021	0.025	0.407
Functional	-0.163	0.204	0.424	-0.031	0.038	0.420
Female	0.533	0.136	0.000	0.100	0.025	0.000
<i>Classes of age (ref.: 18-44)</i>						
45-64	1.025	0.441	0.020	0.171	0.063	0.006
65-74	1.108	0.442	0.012	0.188	0.062	0.002
≥75	0.893	0.443	0.044	0.146	0.062	0.018
<i>Living arrangement (ref.: solo)</i>						
In couple, with/without child(ren)	0.206	0.148	0.165	0.038	0.027	0.160
Other forms of living arrangement	0.430	0.198	0.030	0.082	0.038	0.032
<i>Area of residence (ref.: north)</i>						
Center	-0.137	0.170	0.421	-0.026	0.032	0.419
South and islands	-0.147	0.140	0.296	-0.028	0.027	0.295
<i>Educational level (ref.: high)</i>						
Medium	-0.257	0.207	0.215	-0.050	0.040	0.215
Low	-0.371	0.189	0.051	-0.071	0.037	0.052
<i>Financial resources (ref.: good)</i>						
not good	0.465	0.127	0.000	0.090	0.025	0.000
<i>Social integration domains</i>						
Social engagement	-0.517	0.112	0.000	-0.098	0.021	0.000
Friendship ties	-0.866	0.576	0.133	-0.165	0.109	0.132
Family ties	-0.718	0.512	0.161	-0.137	0.097	0.160
Leisure activities	-0.140	0.044	0.001	-0.027	0.008	0.001
Social support	-0.947	0.277	0.001	-0.180	0.052	0.001
Constant	157.380	31.594	0.000			

Source: our elaborations on data from the Italian survey Social inclusion of people with functional limitations, Istat, 2011

Importantly, we re-run logistic models using as key covariate the indicators of social integration one-by-one singularly, in order to depict if the analysis could be altered by the factor analysis' results. The obtained results were comparable to those presented. Hence, we maintained the factor analysis approach, which has also the advantage to consider simultaneously various components of social integration.

4.3 *Other correlates of self-rated health*

All the coefficients of the control variables included in the model (see again Table 2) show the expected sign. The most relevant correlate of bad self-rated health is the level of disability declared by the individual: having a highly serious impairment implies a probability 23.4 percentage points higher to rate health as bad, relative to those with low level of disability. In contrast, the type of disability does not seem to entail differences in health perception. The gender is not neutral, and women are 10.0 percentage points more likely to perceive bad health relative to men. Keeping as reference category younger respondents (18-44 years old), all other age classes display reduced health assessment, although no differences appear across these older generations. As for the living arrangement, only respondents living with relatives and other persons have higher probability to declare bad health (AME = 0.082). A selection effect is perhaps into play. An educational gradient was found, especially for lower educated people, although significant only at 10% level. On the contrary, a strong negative association with health (AME = 0.090) was found for people in a poor financial situation. Finally, no regional differences were found.

4.4 *Socio-demographic differentials*

The second aim of this study was to verify whether the average effects of social integration domains change depending on individual characteristics. We thus estimated an additional set of 8 logistic models. Beside the main effects of the covariates used in the general model (Table 2), each additional model includes the interaction terms between the 5 integration domains and, one by one, each individual socio-demographic characteristic (namely, the level and type of disability, gender, classes of age, living arrangement, area of residence, educational level and financial resources). Table 3 reports the results coming from these separate models.

A first insight comes from the model with the effects differentiated by level of disability (Model 1). It is interesting to note that the *social engagement* domain, although relevant on average (see again Table 2), is especial-

ly important in reducing the probability to perceive bad health for highly impaired persons (AME = -0.145) relative to low impaired ones (AME = -0.077). The two AMEs are, in fact, significantly different (results from pairwise comparisons not shown but available upon request). The greater importance of the *family ties* domain for higher levels of disability than for low levels (AME = -0.356 and AME = -0.021 respectively) was rather predictable and consistent with previous findings (e.g., Holanda *et al.*, 2013). For the other integration domains, the marginal effects differentiated by level of disability do not depart from the average effects.

Some differentials are linked to the type of disability, too. First, none of the domains of social integration matters for health for persons with functional disability, while *social support* is important in reducing health only for disabled with difficulty in communication. Importantly, whereas the *family ties* domain is key for persons with problems in their communicative functions (AME = -0.285), *friendship ties* demonstrate efficacy especially for persons with movement disability (AME = -0.343, significant at 10% level).

This detailed analysis enabled us to highlight also that the *family ties* domain, whereas not relevant for self-rated health overall, is meaningful in reducing the risk of bad health for oldest old (i.e. 75-year-old and over, AME = -0.376). *Friendship ties* and *social support* domains have certain relevance for adult disabled (i.e. 45-64 years old, AMEs respectively equal to -0.824 and -0.459). Younger disabled do not display significant associations with any domains, maybe due to the reduced size of this age group.

Differently from some previous research (e.g., Caetano *et al.*, 2013), we did not find that the effects of social integration domains proved on the whole sample differ substantially by gender, living arrangement and area of residence. For Italians living in central regions, in particular, it seems that none of the domains of social integration is significant, but this result may stem from the limited sample size. Finally, the *social support* and the *leisure activities* domains are crucial mostly in the reduction of the probability of bad health for socio-economic deprived individuals (low education and poor financial resources) than for higher educated and well-off ones.

Table 3 – Results from the logistic regression models predicting probability of being in bad health: Average Marginal Effects (AMEs) for interaction terms between social integration domains and individual socio-demographic characteristics, Italy, 2011 (N = 1,463)

	Social engagement		Friendship ties		Family ties		Leisure activities		Social support	
	AME	sig.	AME	sig.	AME	sig.	AME	sig.	AME	sig.
<i>Mod. 1: int. with level of disability</i>										
Low	-0.077	0.001	-0.247	0.069	-0.021	0.861	-0.023	0.015	-0.171	0.008
High	-0.145	0.000	-0.027	0.890	-0.356	0.039	-0.038	0.012	-0.206	0.024
<i>Mod. 2: int. with type of disability</i>										
Communication	-0.130	0.000	-0.146	0.338	-0.285	0.033	-0.030	0.015	-0.274	0.000
Movement	-0.101	0.001	-0.343	0.067	0.123	0.479	-0.035	0.007	-0.093	0.270
Functional	0.063	0.204	0.076	0.776	-0.094	0.697	0.000	0.981	-0.079	0.600
<i>Mod. 3: int. with gender</i>										
Male	-0.096	0.003	-0.301	0.121	0.029	0.869	-0.033	0.008	-0.145	0.100
Female	-0.102	0.000	-0.118	0.383	-0.204	0.092	-0.024	0.031	-0.200	0.002
<i>Mod. 4: int. with classes of age</i>										
18-44	-0.148	0.224	0.200	0.741	-0.412	0.448	-0.030	0.377	-0.041	0.910
45-64	-0.066	0.070	-0.824	0.001	0.281	0.206	-0.021	0.142	-0.459	0.000
65-74	-0.084	0.018	-0.209	0.304	-0.021	0.911	-0.024	0.097	-0.124	0.189
≥75	-0.137	0.000	0.095	0.528	-0.376	0.004	-0.039	0.010	-0.110	0.131
<i>Mod. 5: int. with living arrangement</i>										
Living solo	-0.121	0.000	-0.325	0.085	-0.007	0.968	-0.024	0.058	-0.192	0.029
In couple, with(out) child(ren)	-0.027	0.512	0.136	0.592	-0.362	0.102	-0.021	0.186	-0.180	0.133
Other forms of living arr.	-0.112	0.000	-0.153	0.318	-0.156	0.262	-0.032	0.020	-0.169	0.022
<i>Mod. 6: int. with area of residence</i>										
North	-0.101	0.003	0.002	0.993	-0.304	0.059	0.004	0.810	-0.206	0.026
Center	-0.101	0.000	-0.225	0.128	-0.037	0.779	-0.031	0.003	-0.135	0.047
South and islands	-0.090	0.049	-0.330	0.307	-0.139	0.637	-0.050	0.021	-0.332	0.019
<i>Mod. 7: int. with educational level</i>										
High	-0.080	0.042	-0.417	0.111	0.105	0.645	-0.032	0.037	-0.208	0.117
Medium	-0.116	0.004	-0.364	0.153	-0.111	0.622	-0.024	0.162	-0.340	0.003
Low	-0.102	0.000	-0.007	0.959	-0.241	0.044	-0.022	0.063	-0.125	0.045
<i>Mod. 8: int. with financial resources</i>										
Good	-0.097	0.000	-0.047	0.764	-0.160	0.244	-0.017	0.084	-0.096	0.192
Not good	-0.106	0.001	-0.298	0.054	-0.116	0.405	-0.047	0.001	-0.267	0.000

Reading: Models 1 to 8 include all the other covariates listed in Table 2 and, one by one, the interaction terms between the five domains of social integration and the covariate specified. For sake of brevity we display here only the AMEs of the interaction terms. Results for the other covariates are consistent with the global estimates of Table 2 and are available upon request to Authors.

Source: our elaborations on data from the Italian survey Social inclusion of people with functional limitations, Istat, 2011

5. CONCLUDING DISCUSSION

National and international targets and agendas have emphasized the need to build societies that are more and more inclusive of persons with disability (Istat, 2009; World Health Organization, 2011). This interest draws attention on the role of social networks, social support and social participation on health and well-being. Research from different contexts proved the existence of a certain correlation between integration in social life and health or health-related measures, especially for certain population sub-groups, such as the elderly. Evidence on this link for disabled people is very sparse however and, to the best of our knowledge, it is completely absent for Italy. In this study we aimed at assessing if and to what extent different domains of social integration are associated with self-rated health of disabled Italian persons, and at evaluating if this link changes depending on individual characteristics.

First, we found that, beside inequalities linked to socio-economic background (which is generally addressed in the literature and whose role is not called into question), social relationships are crucial in determining inequalities in self-rated health for Italian disabled. Indeed, because this is a cross-sectional study, the possibility of reverse causality cannot be ruled out: social relationships could be somewhat blocked for people in poor health, whereas healthy people could have fewer difficulties to participate to different kinds of activities and enlarge their networks. Nonetheless, the link between social integration and self-rated health persisted even after accounting for the degree of disability and other individual correlates. Moreover, we are comforted by previous longitudinal studies (e.g., Bennett, 2005; Giordano *et al.*, 2012; Sirven and Debrand, 2012) which reached consistent conclusions.

In particular, our findings showed that, other things equal, *social engagement* is a crucial factor associated with good self-rated health of Italians affected by disability, more than *family* or *friendship ties*. This is true above all for highly impaired disabled persons. Moreover, the involvement in *leisure activities* proved a relevant association with good health, especially for those in a poor financial situation. Going to theatre, cinema, museums, simply going out, or participating to (different types of) associations proved to be a form of social connection strongly associated with good self-rated health. The domain of *social engagement* (and of *leisure activities* to a lesser extent) serves the function of self-esteem and self-efficacy building (Bassuk *et al.*, 1999; Cattell, 2001; Caetano *et al.* 2013), and possibly this is especially important for disabled persons; being highly socially engaged probably increases the sense to feel part of a community, enjoying its chances as people without impairments. The feeling to be like the others, beyond one's disability, develops a sense of self-esteem, identity, and purpose.

Surprisingly, *family* and *friendship* ties are not significantly associated to self-rated health, overall. Previous studies found that the formation of a

social support network coming from the (nuclear) family, and to a lesser extent also from neighbors and friends, is of fundamental importance in the life and in the quality of care of persons with disability (Berkman *et al.*, 2000; Holanda *et al.*, 2013; Litwin and Stoeckel, 2013). This result seems somewhat unexpected in a country like Italy, well-known for its strong ties, family and friendship assistance. We think that our results do not contradict the importance of family in Italy, however. In effect, Italian disabled persons see their family members often, so it is likely that this element simply does not represent a discriminant in self-rated health inequalities. We cannot exclude however that the lack of predictive value of family and friends networks is attributable to measurement problems in the variables used. It is nonetheless true that family ties have a certain role especially for some groups of people, such as highly impaired ones or elderly. This result is consistent with previous findings showing that family ties are strong correlates of health among elderly (Litwin and Stoeckel, 2013).

In addition, we found that the availability of *support* afforded by social networks, more than social networks themselves, is key to reducing self-rated health inequalities. The assistance and help – even only potential – and the mechanisms of valuations that they determine, are meaningful in reducing the risk of bad self-rated health. This result is in line with previous literature affirming that the individual's perception of the availability of support can be more revealing in social integration than the concrete support actually received (e.g., Gilmour, 2012). *Social support* domain also acts in a differentiated way according to age and socio-economic status. In this case, the main beneficiaries of social support are the youngest disabled, the low educated ones and those in a deprived financial situation.

Despite the lack of information on causal inferences, our results highlight associations between domains of social integration and self-rated health, and some practical implications can be drawn from them. As higher active participation, social contacts and social support are related to better health, efforts to improve opportunities to engage in social activities and facilitate access to help when needed should receive greater attention from policy makers and, more generally, from the whole community. In brief, social activities, engagement, and social networks should integrate health promotion programs. This could be remarkably valuable for disabled people who, due to difficulty of movement, communication or in doing daily-living activities, are more likely to be restricted in their social life, with reduced opportunities for social inclusion. This study highlights once more the need to eliminate disability-specific discriminatory practices and all barriers – not only environmental, but also cultural and social – that prevent a full participation of disabled persons in everyday life. Indeed, a modern and inclusive society should not only eliminate obstacles, but also *promote* and *encourage* social and community involvement, possibly thinking at targeted interventions differentiated by socio-economic individual characteristics. For instance, enlargement

of services and facilities or reduction of prices could stimulate social participation of people in economic disadvantage. Another measure could include the organization of events (e.g., cultural, of leisure, educational) specific for certain population groups (e.g., elderly, disabled, groups of persons with the same type of disability, low educated persons).

We think that it is particularly important to address the barriers faced in everyday life by the thousands of disabled who express a desire to participate in social activities. For example, according to the Italian data, a percentage of disabled ranging from 10 to 20% declared that the main reason for which they do not meet friends, relatives, do not go to theatres, museums, or go out, is the lack of proper public transport. Moreover, almost 30% declared that these activities are blocked due to the lack of help, assistance and support. Assistance and integration cannot be left only to families and more intimate peers, and support provided by the public sector or other (voluntary/private) organizations could be useful to improve social participation and social engagements of disabled persons and thus their health-related well-being. An active social life may develop or reinforce personal abilities and resources - i.e., self-efficacy, self-esteem, purposefulness - that enhance strength in the face of disease process. In addition, because the networks of individuals with disability worsen over time (Ribeiro, 2010), social participation should be encouraged since young ages and even when there are no health-related problems.

Beside these practical recommendations, the present study can also offer suggestions about directions for future research and data collection. Generally speaking, our analyses confirmed that a multidimensional approach is preferable for the understanding of the effects of the multifaceted social environment on health status (e.g., Drum *et al.*, 2008; Nummela *et al.*, 2008). It is straightforward that social integration should be understood not merely as contacts with others people, but also as more extended community and leisure activities, and more general opportunities of participation in every sort of relationship. Second, longitudinal research clearly is needed to further clarify the relative contribution of disability, emotional and material resources, social networks and social participation on self-rated health and/or well-being during individuals' life courses. These elements are crucial in order to design effective interventions to strengthen the health-promoting aspects of social milieu in which individuals live.

More specifically as for the Italian context, we believe that a further effort in data collection is needed. We used one of the rare sources of data on disability in Italy, a survey representative at national level; however, some shortcomings should be tackled. First, this study was limited due to the incomplete and not uniform information about relationships and social activities of disabled or the absence of more detailed information (e.g., different scales, absence of information about some activities, about relationship satisfaction or about the precise number of contacts with the different groups of peers). Even if a rough analysis has been possible and useful insights have

been obtained, future research should be able to deeply explore integration domains in terms, for instance, of duration, reciprocity, and satisfaction, hence to include both quantitative and qualitative features of social embeddedness. Second, a larger sample size would allow a more detailed and meaningful analysis (e.g., by type of disability or by age). This could lead to a better understanding of those elements that are actually crucial in the inclusion process of disabled persons in the social life.

References

- BASSUK S.S., GLASS T.A., BERKMAN L.F. (1999), "Social disengagement and incident cognitive decline in community-dwelling elderly persons", *Annals of Internal Medicine*, 131, 65-173.
- BENNETT K. M. (2005), "Social engagement as a longitudinal predictor of objective and subjective health", *European Journal of Ageing*, 2, 48-55.
- BERKMAN L.F. (1984), "Assessing the physical health effects of social networks and social support", *Annual Review of Public Health*, 5, 413-432.
- BERKMAN L.F. (1988), "The changing and heterogeneous nature of aging and longevity: A social and biomedical perspective", *Ann. Rev. Ger. Geriatrics*, 8, 37-68.
- BERKMAN L.F., GLASS T., BRISSETTE I., SEEMAN T.E. (2000), "From social integration to health: Durkheim in the new millennium", *Social Science & Medicine*, 51, 843-857.
- CAETANO S.C., SILVA C., VETTORE M. (2013), "Gender differences in the association of perceived social support and social network with self-rated health status among older adults: a population-based study in Brazil", *BMC Geriatrics*, 13, 122.
- CATTEL V. (2001), "Poor people, poor places, and poor health: the mediating role of social networks and social capital", *Social Science & Medicine*, 52, 1501-1516.
- CORNWELL E.Y., WAITE L.J. (2009), "Social Disconnectedness, Perceived Isolation, and Health among Older Adults", *Journal of Health and Social Behavior*, 50, 1, 31-48.
- COTT C.A., GIGNAC M.A.M., BADLEY E.M. (1999), "Determinants of self-rated health for Canadians with chronic disease and disability", *Journal of Epidemiologic Community Health*, 53, 731-736.
- CUTRONA C.E., RUSSEL D.W. (1987), "The Provisions of Social Relationships and Adaptation to Stress", *Advances in Personal Relationships*, 1, 37-67.

- DEINDL C., BRANDT M., HANK K. (2015), "Social networks, social cohesion, and later-life health", *Social Indicators Research*, on-line first.
- DRUM C.E., HORNER-JOHNSON W., KRAHN G.L. (2008), "Self-rated health and healthy days: Examining the 'disability paradox'", *Disability and Health Journal*, 1, 71-78.
- EMERSON E., HATTON C., ROBERTSON J., BAINES S. (2014), "Perceptions of neighborhood quality, social and civic participation and the self-rated health of British adults with intellectual disability: cross sectional study", *BMC Public Health*, 14, 1252.
- EMERSON E., MADDEN R., GRAHAM H., LLEWELLYN G., HATTON C., ROBERTSON J. (2011), "The health of disabled people and the social determinants of health", *Public Health*, 125, 145-147.
- FIORI K.L., SMITH J., ANTONUCCI T.C. (2007), "Social Network Types Among Older Adults: A Multidimensional Approach", *Journal of Gerontology: Psychological Sciences*, 62B(6): 322-330.
- FRATIGLIONI L., WANG H.X., ERICSSON K., MAYTAN M., WINBLAD B. (2000), "The influence of social network on the occurrence of dementia: a community-based longitudinal study", *Lancet*, 355, 9212, 1315-1319.
- GILMOUR H. (2012), "Social participation and the health and well-being of Canadian seniors", *Health Reports*, 23, 4, Statistics Canada, Catalogue no. 82-003-XPE.
- GINI C. (1914), *Sulla misura della concentrazione e della variabilità dei caratteri*, Venezia: Premiate officine grafiche C. Ferrari.
- GIORDANO G.N., BJORK J., LINDSTROM M. (2012), "Social capital and self-rated health. A study of temporal (causal) relationships", *Social Science & Medicine*, 75, 340-348.
- GLASS T.A., MENDES DE LEON C., MAROTTOLI R.A., BERKMAN L.F. (1999), "Population based study of social and productive activities as predictors of survival among elderly American", *BMJ*, 319, 478-483.
- HAWTON A., GREEN C., DICKENS A.P., RICHARDS S.H., TAYLOR R.S. EDWARDS R., GREAVES C.J., CAMPBELL J.L. (2011), "The impact of social isolation on the health status and health-related quality of life of older people", *Quality of Life Research*, 20, 57-67.
- HEIKKINEN R., KAUPPINEN M. (2004). "Depressive symptoms in late life: A 10-year follow-up", *Archives of Gerontology and Geriatrics*, 38, 239-250.
- HOLANDA C.M.A., PAS DE ANDRADE F.L.J., BEZERRA M.A., NASCIMENTO J.P.S., NEVES R.F., ALVES S.B., RIBEIRO K.S.Q.S. (2013), "Support networks and people with physical disabilities: social inclusion and access to health services", *Ciencia & Saude Coletiva*, 20(1): 175-184.
- IDLER E.L., BENYAMINI Y. (1997), "Self-Rated Health and Mortality: A Review of Twenty-Seven Community Studies", *Journal of Health and Social Behavior*, 38, 21-3.

- ISTAT (2009), *La disabilità in Italia. Il quadro della statistica ufficiale*. Argomenti n. 37, Istat, Roma.
- ISTAT (2012), *Inclusione sociale delle persone con limitazioni dell'autonomia personale, Anno 2011*, Statistiche Report, Istat, Roma.
- ISTAT (2015), *Le dimensioni della salute in Italia. Determinanti sociali, politiche sanitarie e differenze territoriali*, Istat, Roma.
- KANG H., MICHAEL Y.L. (2013), "Social integration: how is related to self-rated health?", *Advances in Aging Research*, 2(1): 10-20.
- KIM J.O., MUELLER C.W. (1978), *Introduction to factor analysis: What it is and how to do it*, Newbury Park, CA: Sage.
- KLINE R.B. (2011), *Principles and practice of structural equation modeling*. New York, London: The Guilford Press.
- KUMAR S., CALVO R., AVENDANO M., SIVARAMAKRISHNAN K., BERKMAN L.F. (2012), "Social support, volunteering and health around the world: Cross-national evidence from 139 countries", *Social Science & Medicine*, 74, 696-706.
- LITWIN H., STOECKEL K.J. (2013), "Confidant Network Types and Well-Being Among Older Europeans", *The Gerontologist*, doi:10.1093/geront/gnt056.
- LOCKER D. (2008), "Social Determinants of Health and Disease", in SCAMBLER G. (ed.), *Sociology as applied to medicine*. Edinburgh, New York: Saunders/Elsevier.
- MARSDEN P.V., FRIEDKIN N.E. (1994), "Network studies on social influence", in WASSERMAN S., GALASKIEWICZ J. (eds.), *Advances in social network analysis: research in the social and behavioral science*, Thousand Oaks, CA, Sage: 3-25.
- MELCHIOR M., BERKMAN L.F., NIEDHAMMER I., CHEA M., GOLDBERG M. (2003), "Social relations and self-reported health: a prospective analysis of the French Gazel cohort", *Social Science & Medicine*, 56, 1817-1830.
- MENEC V.H. (2003), "The relation between everyday activities and successful aging: A 6-year longitudinal study", *The Journals of Gerontology: Series B*, 58, 74-82.
- MILUNPALO S., VUORI I., OJA P., PASANEN M., URPONEN H. (1997), "Self-rated health status as a health measure: the predictive value of self-reported health status on the use of physician services and on mortality in the working-age population", *Journal of Clinical Epidemiology*, 50, 517-528.
- MITHEN J., AITKEN Z., ZIERSCH A., KAVANAGH A.M. (2015), "Inequalities in social capital and health between people with and without disabilities", *Social Science & Medicine*, 126, 26-35.
- MOOD C. (2010), "Logistic regression: why we cannot do what we think we can do and what we can do about it", *European Sociological Review*, 26, 67-82.
- MORGAN M., PATRICK D.L., CHARLTON J.R. (1984), "Social networks and psychosocial support among disabled people", *Social Science & Medicine*, 19(5): 489-497.

- MUSICK M.A., HERZOG A.R. HOUSE J.S. (1999), "Volunteering and mortality among older adults: Findings from a national sample", *The Journals of Gerontology: Series B*, 54, 173-180.
- NUMMELA O., SULANDER T., RAHKONEN O., UUTELA A. (2008), "Associations of self-rated health with different forms of leisure activities among ageing people", *International Journal of Public Health*, 53, 227-235.
- PUTNAM R.D. (2000), *Bowling Alone*. New York, NY, Simon & Schuster.
- RIBEIRO K.S.Q.S. (2010), "A Relevancia das Redes de Apoio Socialno Processo de Reabilitacao", *Revista Brasileira de Ciências da Saúde*, 13(2): 69-78.
- SCHWARZER R., LEPPIN A. (1989), "Social support and health: a meta-analysis" *Psychology and Health*, 3, 1-15.
- SEEMAN T.E. (1996), "Social ties and health: the benefits of social integration", *Annals of Epidemiology*, 6(5): 442-451.
- SEEMAN T.E., MCEWEN B.S. (1996), "Social environment characteristics and neuroendocrine function: The impact of social ties and support on neuroendocrine regulation", *Psychosomatic Medicine*, 58.
- SINGH-MANOUX A., RICHARDS M., MARMOT M. (2003), "Leisure activities and cognitive function in middle age: evidence from the Whitehall II study", *Journal of Epidemiology Community Health*, 57, 907-913.
- SIRVEN N., DEBRAND T. (2008), "Social participation and healthy ageing: An international comparison using SHARE data", *Social Science & Medicine*, 67, 2017-2026.
- SIRVEN N., DEBRAND T. (2012), "Social capital and health of older Europeans: Causal pathways and health inequalities", *Social Science & Medicine*, 75, 1288-1295.
- STANSFELD S. (2006), "Social support and social cohesion", in MARMOT M, WILKINSON R.G. (eds.), *Social determinants of health*. London, UK: Oxford University Press (pp. 148–171).
- WANG H-X, KARP A., WINBLAD B., FRATIGLIONI L. (2002), "Late-Life Engagement in Social and Leisure Activities Is Associated with a Decreased Risk of Dementia: A Longitudinal Study from the Kungsholmen Project", *American Journal of Epidemiology*, 155, 1081-1087.
- WORLD HEALTH ORGANIZATION (2011), *World report on disability 2011*, Geneva: World Health Organization.
- YOUM Y., LAUMANN E.O., FERRARO K.F., WAITE L.J., KIM H.C., PARK Y.R., CHU S.H., JOO W., LEE J.A. (2014), "Social network properties and self-rated health in later life: comparisons from the Korean social life, health, and aging project and the national social life, health and aging project", *BMC Geriatrics*, 14, 102.

Appendix

Table A1 – Indicators of social integration used in factor analysis, response categories and sample distribution by self-rated health (N = 1,463)

Variable	Indicator	Questionnaire formulation	Response categories	Sample distribution	
				Good/fair health	Bad health
Total					
help_fam	Availability of help from relatives in case of need	In case of need can you rely on help of relatives?	no	14.5	21.8
help_friends	Availability of help from friends in case of need	In case of need can you rely on help of friends?	yes	85.5	78.2
help_neigh	Availability of help from neighbors in case of need	In case of need can you rely on help of neighbors?	no	42.2	54.7
freq_fam	Frequency of contacts with relatives	How often do you meet relatives that do not live with you?	yes	57.8	45.3
freq_fam_perc	Satisfaction of contacts with relatives	Do you meet relatives not living with you ...	no	45.4	54.5
freq_friends	Frequency of contacts with friends	How often do you meet friends?	less than monthly	54.6	45.5
freq_friends_perc	Satisfaction of contacts with friends	Do you meet friends ...	monthly	14.3	15.1
freq_assoc	Participation in associations	Have you participated in associations, organizations or voluntary groups in the last 12 months?	less frequently than desired	85.7	84.9
freq_go_out	Frequency of going out	How often do you go out from your home?	as than desired	18.3	25.5
trips	Participation in trips	Have you make holiday trips in the last 12 months?	less than monthly	81.7	74.5
reading	Reading books	Have you read books in the last 12 months?	as than desired	10.7	18.0
cin_theat	Attendance of cinema, theatres, opera, or concerts	Do you go to cinema, theatres, opera, or concerts?	monthly	89.3	82.0
museum	Attendance of museums or exhibitions	Do you go to museums or exhibitions?	less frequently than desired	16.6	21.4
			as than desired	83.4	78.6
			no	89.9	93.5
			yes	10.1	6.5
			less than weekly	9.7	28.0
			at least one time per week	30.8	43.1
			daily	59.6	28.8
			no	67.9	80.4
			yes	32.1	19.6
			no	66.7	74.9
			less than 5	21.5	17.8
			5 or more books	11.8	7.3
			not interested in	66.6	71.4
			do not perform it	10.9	16.5
			less than desired	9.7	6.1
			as frequently as desired	12.8	6.1
			not interested in	67.1	75.7
			do not perform it	11.4	15.5
			less than desired	8.7	5.3
			as frequently as desired	12.8	3.5
					9.6

Source: our elaborations on data from the Italian survey Social inclusion of people with functional limitations, Istat, 2011

Table A2 – Rotated factor loadings (pattern matrix) resulting from factor analysis ($N = 1,463$)

Variables	Factor1 <i>Social engagement</i>	Factor2 <i>Friendship ties</i>	Factor3 <i>Family ties</i>	Factor4 <i>Leisure activities</i>	Factor5 <i>Social support</i>
help_fam	-0.002	0.069	0.292	-0.053	0.549
help_friends	0.305	0.052	0.042	-0.009	0.737
help_neigh	-0.016	0.100	0.011	0.081	0.636
freq_fam	-0.052	0.074	1.110	-0.006	0.091
freq_friends	0.211	0.462	0.448	-0.021	0.198
freq_fam_perc	-0.087	0.395	0.626	-0.036	0.176
freq_friends_perc	0.057	1.310	0.261	0.029	0.167
freq_assoc	0.684	-0.013	0.034	0.114	0.088
freq_go_out	0.437	0.148	0.141	0.055	0.084
trips	0.637	0.065	-0.043	0.098	0.053
reading	0.633	-0.062	-0.129	0.096	0.011
cin_theat	0.606	0.026	-0.046	0.465	0.017
museum	0.549	-0.003	-0.031	1.116	0.052

Reading: Absolute factor loadings higher than 0.4 are displayed in bold.

Source: our elaborations on data from the Italian survey Social inclusion of people with functional limitations, Istat, 2011.